EXHIBIT 1

IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
LUFKIN DIVISION

MOTIVA PATENTS, LLC, Plaintiff, v. SONY CORPORATION, ET AL.	Civil Action No. 9:18-cv-00180-JRG-KFG **Consolidated Lead Case**
FACEBOOK TECHNOLOGIES LLC F/K/A OCULUS VR, LLC	9:18-cv-00178-JRG-KFG
HTC CORPORATION Defendants.	9:18-cv-00179-JRG-KFG

DEFENDANTS' JOINT PRELIMINARY INVALIDITY CONTENTIONS

Under Local Patent Rule 3-3 and the Docket Control Order (Dkt. No. 56), the undersigned Defendants in the above-captioned cases (collectively, "Defendants"), by and through their counsel, set forth their Joint Invalidity Contentions regarding U.S. Patent Nos. 7,292,151 ("the '151 patent"), 7,952,483 ("the '483 patent"), 8,159,354 ("the '354 patent"), 8,427,325 ("the '325 patent"), and 9,427,659 ("the '659 patent") (collectively the "Asserted Patents").[1] These contentions set forth Defendants' preliminary Invalidity Contentions with respect to the claims currently asserted by Plaintiff Motiva Patents, LLC ("Plaintiff" or "Motiva"). Discovery is

[1] These Joint Preliminary Invalidity Contentions should not be construed as a waiver to any defense, objection, or motion related to personal jurisdiction or venue, and each Defendant maintains any and all objections, defenses, and motions relating to jurisdiction and venue that have been previously raised.

ongoing and Defendants reserve the right to amend and/or supplement these Initial Invalidity Contentions as the case proceeds.

Defendants also serve herewith the document production accompanying these disclosures under Local Patent Rule 3-4.

I. INVALIDITY CONTENTIONS

The following contentions are based on Defendants' current understanding of the Asserted Claims as applied in Plaintiff's Infringement Contentions, served January 8, 2019, without the benefit of claim construction and only limited discovery. To the extent Plaintiff has asserted that a claim element is a software limitation under section 3(a)(i) of Judge Gilstrap's discovery order, no inference is intended, nor should any be drawn, that Defendants agree with or concede that assertion. Pursuant to section 3(a)(ii) of Judge Gilstrap's discovery order, Defendants reserve the right to supplement their invalidity contentions. Accordingly, these Invalidity Contentions may reflect various potential and alternative positions regarding claim construction and scope. To the extent these contentions reflect or suggest a particular interpretation or reading of any claim element, Defendants do not adopt, advocate, or acquiesce to such an interpretation or reading. Nor do these Invalidity Contentions constitute any admission by Defendants that any accused products or services, including any current or past versions of those products or services, are covered by any Asserted Claim. Defendants do not take any position herein regarding the proper scope or construction of the Asserted Claims.

These Invalidity Contentions take into account and apply Plaintiff's apparent interpretations of the Asserted Claims, as best understood by Defendants. Accordingly, any assertion herein that a particular limitation is disclosed by a prior art reference or references may be based in part on Plaintiff's apparent interpretation and is not (nor is it intended to be) an

admission by Defendants that any such construction is supportable or correct. To the extent the following contentions reflect constructions of claim limitations consistent with or implicit in Plaintiff's Infringement Contentions, no inference is intended, nor should any be drawn, that Defendants agree with or concede those claim constructions. Defendants expressly do not do so, and reserve their right to contest them.

To the extent that prior art cited for a particular limitation discloses functionality that is the same or similar in some respects to the alleged functionality in the accused products and/or services as set forth in Plaintiff's Infringement Contentions, Defendants do not concede that those limitations are in fact met by those accused functionalities.

Defendants further reserve the right to supplement and amend these disclosures and associated document production based on further investigation, analysis, and discovery, Defendants' consultation with experts and others, and contentions or court rulings on relevant issues such as claim construction and priority dates. For example, since discovery is in the early stages, deposing the alleged inventors of the Asserted Patents may reveal information that affects the disclosures and contentions herein. Also, Defendants have not completed discovery from third parties who have information concerning the prior art cited herein and possible additional art. Defendants also reserve the right to amend these Invalidity Contentions and/or to modify their selection of prior art references in the event that Plaintiff serves supplemental or modified infringement contentions.

Because Defendants are continuing their search for and analysis of relevant prior art, Defendants reserve the right to revise, amend, and/or supplement the information provided herein, including identifying, charting, and/or relying upon additional prior art references, relevant disclosures, and bases for Invalidity Contentions. Additional prior art, disclosures, and invalidity

defects, whether or not cited in this disclosure and whether known or not known to Defendants, may become relevant as investigation, analysis, and discovery continue. Defendants are currently unaware of the extent, if any, to which Plaintiff will contend that limitations of the Asserted Claims are not disclosed in the prior art identified by Defendants. To the extent that such an issue arises, Defendants reserve the right to identify and rely upon other references or portions of references regarding the allegedly missing limitation(s).

Additionally, because discovery has only recently commenced, Defendants reserve the right to present additional prior art references and/or disclosures under 35 U.S.C. §§ 102(a), (b), (e), (f), and/or (g), and/or § 103, located during the course of such discovery or further investigation, and to assert invalidity under 35 U.S.C. §§ 102(c), (d), or (f), to the extent that such discovery or investigation yields information forming the basis for such invalidity.

A. Identity of Each Item of Prior Art (P.R. 3-3(a))

Under P.R. 3-3(a), and subject to Defendants' reservation of rights, Defendants identify each item of prior art that anticipates or renders obvious one or more of the Asserted Claims in the attached Prior Art Index submitted herewith. *See* Appendix A, *infra*. To the extent that the references listed in Appendix A are not identified as items of prior art that anticipate or render obvious an Asserted Claim, Defendants intend to rely on these references as background and as evidence of the state of the art at the time of Plaintiff's alleged invention.

Additionally, the prior art references cited by Defendants include references that are related patent applications and issued patents that contain substantially the same subject matter (*e.g.*, published U.S. patent applications, and issued U.S. patents, foreign applications or issued patents). Any citation to or quotation from any of these patent applications or patents, therefore, should be understood as encompassing any parallel citation to the same subject matter in other related or

corresponding applications or patents. For example, where a claim chart cites a published patent application that ultimately issued as a patent with substantially the same written description, Defendants may rely upon the published patent application and/or the issued patent as prior art.

Defendants also reserve the right to later rely upon all references or portions of references provided in Appendix A to supplement or amend its disclosures contained herein. Also, to the extent not expressly mentioned herein, Defendants incorporate by reference (1) any and all prior art contained or identified in documents produced thus far by Plaintiff to Defendants in this case, (2) any and all additional materials regarding invalidity that should have been produced to Defendants but have not been produced to date, to the extent that any exist, (3) any and all prior art cited or referenced during the *inter partes* reexaminations of the '151 and '483 patents as well as related U.S. Patent No. 7,492,268, and (4) any and all prior art developed by the named inventors of the Asserted Patents while working as an employee or consultant for companies Impulse Technology Ltd., French Sportech Corporation, Trazer Technologies, and Arena, Inc.

Each disclosed item of prior art is evidence of a prior invention by another under 35 U.S.C. § 102(g), as evidenced by the named inventors, authors, organizations, and publishers involved with each such prior art reference. Defendants further intend to rely on admissions of the named inventors of the Asserted Patents concerning the prior art, including statements found in the Asserted Patents, their prosecution histories, related patents and/or patent applications, any deposition testimony, and the papers filed and any evidence submitted by Plaintiff in conjunction with this litigation.

Finally, Defendants note that disclosures in the Asserted Patents themselves either anticipate the claimed inventions or render the claimed inventions obvious, either alone or in combination with the prior art references disclosed in these Invalidity Contentions. Defendants

may rely upon the statements in the Asserted Patents as admitted prior art. For example, in the Background and Summary of the Invention section of the Asserted Patents, the specification describes that "[k]nown are commercial tracking and display systems that employ either singularly, or a hybrid fusion thereof, mechanical, inertial, acoustical or electromagnetic radiation sensors to determine a mobile object's position and orientation, referred to collectively as pose." '151 patent at 1:18-22. In addition, the inventors of the Asserted Patents recognize that "[t]he tracking system's components may be tethered with obvious inherent movement restrictions, or use wireless communication means to remotely transmit and process the information and allow for greater mobility and range of movement." *Id.* at 1:28-32. As another example, the inventors of the Asserted Patents state the following:

> Typically these tracking systems are utilized for biomechanics and gait analysis, motion capture, or performance animation and require the sensors to be precisely mounted on the joints. Various means of presenting the tracking information in a visual display are employed, such as Heads-Up Display (HUD), that provide occluded or see-through visibility of the physical world, or Fixed-Surface Display (FSD), such as computer desktop monitors, depending upon the simulation and immersive quality required for the application. The application may require various degrees of aural, visual, and tactile simulation fidelity and construct direct or composite camera views of the augmented or three dimensional (3D) virtual reality environment to elicit interactive user locomotion and/or object manipulation to enhance the user's performance and perception therein. The tracked object may be represented in the virtual environment in various forms, i.e., as a fully articulated anthropoid or depicted as a less complex graphical primitive. The rendering strategy employed depends upon the degree of photo realism required with consideration to its computational cost and the application's proprioception requirements.

Id. at 1:33-53.

B. Whether Prior Art Anticipates or Renders Obvious (P.R. 3-3(b))

Under P.R. 3-3(b), and subject to Defendants' reservation of rights, Defendants identify in the attached **Exhibits A1-A34, B1-B34, C1-C34**, **D1-D34**, and **E1-E34** (Prior Art Invalidity

Charts) prior art references that anticipate the Asserted Claims under at least 35 U.S.C. §§ 102(a), (b), (e), and/or (g), either expressly or inherently, and/or render obvious the Asserted Claims under 35 U.S.C. § 103 either alone or in combination with other references. Each Asserted Claim is anticipated by, and/or obvious in view of, one or more items of prior art identified in these disclosures, alone or in combination.

Much of the art identified in the attached exhibits/charts reflects common knowledge and the state of the art at the time of the earliest priority date of the Asserted Patents. Defendants may rely on additional citations, references, expert testimony, and other material to provide context or to aid in understanding the cited portions of the prior art references and/or cited features of the systems. Defendants may also rely on expert testimony explaining relevant portions of prior art references, relevant hardware or software products or systems, and other discovery regarding these subject matters. Additionally, Defendants may rely on other portions of any prior art reference for purposes of explaining the background and general technical subject area of the reference.

Where an individual prior art reference is cited with respect to all elements of an Asserted Claim, Defendants contend that the reference anticipates the claim under 35 U.S.C. §§ 102(a), (b), (e), and/or (g) and also renders obvious the claim under 35 U.S.C. § 103, both by itself in view of the knowledge of a person of ordinary skill in the art and in combination with the other cited prior art references to the extent the reference is not found to disclose one or more claim elements. A single prior art reference, for example, can establish obviousness where the differences between the disclosures within the reference and the claimed invention would have been obvious to one of ordinary skilled in the art. For example, "[c]ombining two embodiments disclosed adjacent to each other in a prior art patent does not require a leap of inventiveness." *Boston Scientific Scimed, Inc. v. Cordis Corp.*, 554 F.3d 982, 991 (Fed. Cir. 2009). To the extent Plaintiff contends that an

embodiment within a particular item of prior art does not fully disclose all limitations of a claim, Defendants accordingly reserve the right to rely on other embodiments in that prior art reference, or other information, to show single reference obviousness under 35 U.S.C. § 103(a).

Where an individual prior art reference is cited with respect to fewer than all elements of an Asserted Claim, Defendants contend that the reference renders obvious the claim under 35 U.S.C. § 103(a) in view of each other reference and combination of references that discloses the remaining claim element(s), as indicated in the claim charts submitted herewith and in the discussion in Part **I.B.1** below. "Under § 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or nonobviousness of the subject matter is determined." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007), quoting *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 17 (1966). Exemplary motivations to combine prior art references are discussed below and in the accompanying charts. Defendants reserve the right to rely upon any prior art references or assertions identified herein in connection with Defendants' contention that each Asserted Claim is invalid under 35 U.S.C. § 103 and to rely upon expert testimony addressing such references and assertions. The fact that prior art is identified to anticipate the Asserted Claims presents no obstacle in also relying on that reference as a basis for invalidity based on obviousness. It is established that "a rejection for obviousness under § 103 can be based on a reference which happens to anticipate the claimed subject matter." *In re Meyer*, 599 F.2d 1026, 1031 (C.C.P.A. 1979). To the extent any prior art reference cited herein may not fully disclose a limitation of an Asserted Claim or is alleged by Plaintiff to lack disclosure of the limitation, such limitation is present and identified in another prior art item as shown in the attached claim charts.

Many of the cited prior art references cite or relate to additional references and/or products, services, or projects. Many of the cited prior art references also cite software, hardware, or systems. Defendants may rely upon such cited additional references and copies or exemplars of such software, hardware, or systems. Defendants will produce or make available for inspection any such cited references, software, hardware, or systems that it intends to rely upon. Defendants may also rely upon the disclosures of the references cited and/or discussed during the prosecution of the Asserted Patents and/or the assertions presented regarding those references.

Defendants reserve the right to further streamline and reduce the number of anticipation or obviousness references relied upon with respect to a given Asserted Claim and to exchange or otherwise modify the specific references relied upon for anticipation and within each obviousness combination for each Asserted Claim. Discovery is at an early stage and Plaintiff has not provided any contentions with respect to any alleged pre-filing invention dates or with respect to claim limitations that are allegedly lacking or not obvious in the prior art. Each limitation of the Asserted Claims was well-known to those of ordinary skill in the art before the filing dates of the provisional application from which each Asserted Patent claims priority, as detailed below. Plaintiff has provided no competent evidence suggesting that the Asserted Patents are entitled to an invention date earlier than July 29, 2004. Plaintiff also identifies this date as the priority date for each Asserted Claim in its P.R. 3-1(e) Infringement Contentions. Accordingly, Defendants have conducted their analysis and selection of prior art based on the July 29, 2004 priority date. Should Plaintiff improperly later assert a different invention or priority date, Defendants reserve the right to investigate and add additional prior art references to these Invalidity Contentions.

As explained in detail throughout these Invalidity Contentions, the Asserted Claims of the Asserted Patents are anticipated and/or obvious in view of the prior art references listed in Appendix A.

1. Obviousness and Motivations to Combine

Each prior art reference may be combined with one or more other prior art references to render obvious the Asserted Claims in combination, as explained in more detail below. The disclosures of these prior art references also may be combined with information known to persons skilled in the art at the time of the alleged invention, and understood and supplemented in view of the common sense of persons skilled in the art at the time of the alleged invention, including any statements in the intrinsic record of the Asserted Patents and related applications.

A person of ordinary skill would have been motivated to combine the above prior art based on the nature of the problem to be solved, the teachings of the prior art, and the knowledge of persons of ordinary skill in the art. The identified prior art references, including portions cited in the Prior Art Invalidity Charts, address the same or similar technical issues and suggest the same or similar solutions to those issues as the Asserted Claims. On such basis, on an element-by-element basis, Defendants expressly intends to combine one or more prior art items identified in Appendix A with each other to address any further contentions from Plaintiff that a particular prior art item supposedly lacks one or more elements of an Asserted Claim. In other words, Defendants contend that each charted prior art item can be combined with other charted prior art items when a particular prior art item lacks or does not explicitly disclose an element or feature of an Asserted Claim. The suggested obviousness combinations described below are not to be construed to suggest that any reference included in the combinations is not anticipatory. Further, to the extent that Plaintiff contends that any of the anticipatory prior art fails to disclose one or more limitations

of the Asserted Claims, Defendants reserve the right to identify other prior art references that, when combined with the anticipatory prior art, would render the claims obvious despite an allegedly missing limitation. Defendants will further specify the motivations to combine the prior art, including through reliance on expert testimony, at the appropriate later stage of this lawsuit.

A person of skill in the art would have been motivated to combine the above-identified prior art items. As the United States Supreme Court held in *KSR International Company v. Teleflex, Inc.*, 550 U.S. 398, 416 (2007): "The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results." The Supreme Court further held that, "[w]hen a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. If a person of ordinary skill can implement a predictable variation, § 103 likely bars its patentability. For the same reason, if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill." *Id.* at 417.

The Supreme Court has further held that "in many cases a person of ordinary skill will be able to fit the teachings of multiple patents together like pieces of a puzzle." *Id.* at 420. It is sufficient that a combination of elements was "obvious to try" holding that, "[w]hen there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product is not a result of innovation but of ordinary skill and common sense." *Id.* at 421. "In that instance the fact that a combination was obvious to try might show that it was obvious under § 103." *Id.*

Finally, the Supreme Court recognized that "[g]ranting patent protection to advances that would occur in the ordinary course without real innovation retards progress and may, in the case of patents combining previously known elements, deprive prior inventions of their value or utility." *Id*. at 419. All of the following rationales recognized in *KSR* support a finding of obviousness:

1) Combining prior art elements according to known methods to yield predictable results;
2) Simple substitution of one known element for another to obtain predictable results;
3) Use of known technique to improve similar devices (methods, or products) in the same way;
4) Applying a known technique to a known device (method, or product) ready for improvement to yield predictable results;
5) "Obvious to try"—choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success;
6) Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations would have been predictable to one of ordinary skill in the art; and
7) Some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

Certain of these rationales are discussed more specifically below. The fact that others are not discussed more specifically should not be interpreted as an admission or concession that it does not apply. To the contrary, the discussion below simply provides more explanation of these specific rationales. As Plaintiff's positions regarding claim construction, specific prior art, specific combinations and/or the state of the art at the time of invention become clear, additional

explanation regarding obviousness and/or motivation to combine specific references and knowledge may become relevant and appropriate. Accordingly, Defendants reserve the right to provide further identification and explanation regarding motivation to combine as the need arises based on positions taken by Plaintiff and/or rulings issued by the Court.

Defendants further contend that the prior art identified in these Invalidity Contentions is evidence of simultaneous or near-simultaneous independent invention by others of the alleged invention as recited in one or more of the Asserted Claims. Defendants reserve the right to rely on the simultaneous or near-simultaneous independent invention by others as further evidence of the obviousness of the Asserted Claims.

Each limitation of the Asserted Claims was well known to those of ordinary skill in the art before the filing dates of the respective non-provisional applications to which each Asserted Patent claims priority, as detailed below and in the attached charts. Plaintiff has provided no competent evidence that the Asserted Patents are entitled to an invention date earlier than July 29, 2004.

The elements recited in the Asserted Claims are mere combinations and modifications of these well-known elements. A person of ordinary skill in the art would be able, and motivated, to improve the existing technology in the same or similar manner by combining or modifying the individual elements that were already known in the art to yield predictable results.

Subject to the foregoing, Defendants identify the following exemplary reasons that skilled artisans would have combined elements of the prior art to render obvious the Asserted Claims. The fact that other reasons are not discussed more specifically should not be interpreted as an admission or concession that other reasons do not apply. To the contrary, the discussion below simply provides more explanation of these specific rationales.

a. Motivations Identified During Prosecution and Reexamination

Defendants hereby expressly incorporate by reference any statements and reasons set forth by the Examiner during prosecution and reexamination of the Asserted Patents and related patent applications as to why it would have been obvious to modify or combine prior art references to achieve the limitations of the Asserted Claims.

b. Combination of Related References

In some instances, multiple prior art publications and/or physical references discuss or address the same or substantially similar underlying system, software, or other project, such as commercial software products and successive versions thereof, or multiple publications discussing the same subject matter. Where multiple prior art references discuss or relate to the same or related underlying projects, systems, or other subject matter, it was obvious to combine the discussions and disclosures of the references as they would be understood to describe features or potential features of the underlying project, system, or subject matter. Similarly, where one prior art reference cites or discusses other references or their teachings, or references have one or more authors in common and a related area of subject matter, it was obvious to consider the teachings of the references in combination with each other due to the express relationships and commonalities between the references.

c. Groups of References

In addition to combinations of references and motivations to combine identified elsewhere herein, including within claim charts, Defendants identify combinations and motivations to combine based on references grouped by subject matter, in the manner approved by courts applying Patent Local Rules regarding invalidity contentions. *See, e.g., Avago Techs. Gen IP PTE Ltd. v. Elan Micro. Corp.*, No. C04-05385 JW (HRL), 2007 U.S. Dist. LEXIS 97464, at *10-11

(N.D. Cal. Mar. 28, 2007) (organizing prior art references into "groups" and identifying combinations as a set of references "and/or" another set of references); *Keithley v. Homestore.com, Inc.*, 553 F. Supp. 2d 1148, 1150 (N.D. Cal. 2008) (following *Avago* – "Apple's grouping method is permissible under the Local Rules").

Furthermore, the particular cited disclosures for each prior art reference addressed in the numbered subsections within this section constitute additional charts identifying where specifically in each item of prior art each applicable element of each Asserted Claim is found, pursuant to Local Patent Rule 3-3(c). The cited disclosures identified in this section are provided in addition to the citations set forth in the claim charts submitted separately herewith.

(1) "Video Game System" References

Claims 44 and 48 of the '483 Patent, claims 32, 49, 50, 63, and 72 of the '354 Patent, claims 1, 32, 49, 50, 63, 72, 85, 89, and 94 of the '325 Patent, and claim 45 of the '659 Patent recite limitations of a video game system. For purposes of these Invalidity Contentions and to the extent the preamble is considered limiting, prior art references that disclose a video game system are "Video Game System" references. While each reference that discloses any of the "Video Game System" limitations as indicated in the claim charts submitted herewith is a "Video Game System" reference, for convenience, the following is a non-exhaustive list of prior art references that are "Video Game System" references:

- Okamoto
- Eyestone
- Nishitani
- Rosenberg
- Cunningham

- Immersion 3D Interaction Product Line
- Martin '812
- Daniel
- Choy
- Colmenarez
- French
- Ohshima
- Natoli
- Marvit
- Woolston
- Yamashita
- Endo
- THRED
- InterSense IS-900
- DataGlove
- Weston

Nothing about these claim limitations adds anything non-obvious over the prior art. The features of video game system were well-known in the art before the alleged invention of the Asserted Patents and are described in the disclosures of numerous references submitted and charted herewith. The claimed functionality is disclosed in the prior art cited herein, including the disclosures cited in the claim charts served herewith and within each of the foregoing identified references. Further, exemplary specific disclosures of the claimed functionality in the prior art,

which disclose the applicable claim limitations and also reflect and illustrate the motivations to implement the claimed functionality and to modify and combine the teachings of the prior art to include the claimed functionality, are identified as follows:

- Daniel concerns a hand-held computer interactive device that may be used with the Sony PLAYSTATION™ game console. Daniel describes "the movement of particular fingers is thus transferred to particular protrusions of the input device. These movements are translated and then transferred to a computing system to initiate a command, respond to a query, provide a command, maneuver objects in an interactive video game, etc." (Daniel, ¶ 32.)
- Choy recognizes that movement, position, and/or orientation tracking, in conjunction with haptic feedback, has an application in "Character Animation for TV, Movies & 3D Games" and "Interactive Game Playing." (Choy, 9:16, 22.)
- Cheng '277 teaches handheld controllers for a video game console. *E.g.*, Cheng '277 at Abstract ("A controller for a video game console includes first and second handheld control units."); 1:7-9 ("This invention relates to a controller for a video game console, more particularly to a controller which has separable handheld control units.").
- Ohshima teaches a video game and VR system that tracks a user's head and hand movement to provide a more interactive experience for the user. *E.g.*, Ohshima at 4:54-62 ("A game apparatus to which a user interface of the present invention is applied will be described in detail hereinafter with reference to the accompanying drawings. As will be apparent from the following description of the embodiment, the user interface of the present invention can be applied to a personal computer

system or workstation system for providing a VR or AR environment to the user in addition to the game apparatus by modifying the present invention within the scope of the invention.").

- Cheok teaches a mixed reality video game system. *E.g.*, Cheok at Abstract ("This paper presents a novel computer entertainment system which recaptures human touch and physical interaction with the real-world environment as essential elements of the game play, whilst also maintaining the exciting fantasy features of traditional computer entertainment.").
- Rosenberg discloses a force feedback interface for use in a video game system. Rosenberg 5:38-42 ("For example, the host application program can be a video game, medical simulation, scientific analysis program, operating system, graphical user interface, or other application program that utilizes force feedback."); 3:18-22 ("In some embodiments, the user controlled graphical object is a cursor in a graphical user interface, while in other embodiments the user controlled graphical object is a simulated vehicle or entity in a graphical video game or the like.").
- Cunningham discloses a haptic interface for use in a video game. Cunningham at 14:5-8 ("Alternatively, the computer 210 can be one of a variety of home video game console systems commonly connected to a television set or other display, such as systems available from Nintendo, Sega, or Sony."); 27:24-28 ("Electronic interface 410 interfaces mechanical and electrical input and output between the force feedback mouse 400 and the computer 210 implementing the application program, such as the simulation, a GUI, or game environment.").

- Natoli discloses a "VR keyboard with specialized keys for a computer game, such as a "STAR TREK" game available through "PARAMOUNT" for providing commands to activate phasers, photo torpedoes, scanning functions, starship acceleration and deceleration, etc. corresponding to actuatable commands in the game. Other computer games such as "DOOM", "HERETIC", and "ULTIMA III" use the keyboard to implement game commands. The disclosed VR keyboard system and method may be used to implement such layouts. In addition, such game command layouts may be loaded into the VR program as configuration files during or after installation of the computer game." (Natoli, 10:52-63.)
- Marvit states that "Handheld device 10 may comprise a mobile phone, personal digital assistant (PDA), still camera, video camera, pocket calculator, portable radio or other music or video player, digital thermometer, game device, portable electronic device, watch or any other device capable of being held or worn by a user." (Marvit, ¶ 34.)
- Björk describes a mixed reality video game system. *E.g.* Björk at 424 ("Aiming to construct a context-aware computer game experience, and to explore how computer games can be designed for social settings, we created Pirates! The game is a multi-player game, implemented on handheld computers connected in a wireless local area network (WLAN), allowing the players to roam a physical environment, the *game arena*.").
- Colmenarez discloses a user input system, and it teaches that "in video game applications, the system of the present invention may enable multiple user interaction and navigation in virtual worlds." (Colmenarez, ¶ 57).

- French teaches a sport simulation where the user competes against a "virtual opponent." *E.g.* French at Abstract ("A system for assessing a user's movement capabilities creates an accurate simulation of sport to quantify and train several novel performance constructs by employing: proprietary optical sensing electronics for determining, in essentially real time, the player's positional changes in three or more degrees of freedom; and computer controlled sport specific cuing that evokes or prompts sport specific responses from the player. In certain protocols of the present invention, the sport specific cuing may be characterized as a "virtual opponent", that may be kinematically and anthropomorphically correct in form and action.") The virtual opponent appears on a visual display. *E.g.* French at 9:45-48 ("The system's video displays the virtual opponent's movement along Path1 214 as a function of dimensions X, Y and X, and time (x,y,z,t) to a virtual Position B 216.")

To the extent a prior art reference is argued or found not to disclose the limitations addressed in this section as recited in the Asserted Claims, and as an alternative to the teachings of that reference if it discloses the limitations, the claimed features would have been obvious to modify or combine with that reference for at least the following reasons in addition to the motivations to combine identified separately in these contentions:

- All elements of the claim are disclosed in the references with no change in their respective functions, and the combination would have yielded nothing more than predictable results.
- The advantages associated with this feature were well-known and would have been appreciated by persons of ordinary skill in the art, thereby motivating the usage of this feature to combine with or modify the teachings of other references. For

example, various video game systems were well known in the art before the alleged invention. In addition, video game systems utilizing hand-held communication devices, such as a haptic feedback controller, were a well-known and conventional prior art infrastructure for providing sensory stimuli, which also would have obviously been used with movement, position, and orientation tracking in order to provide well-known benefits and advantages such as increased immersion, entertainment, and user experience.

- Video games were one of a finite number of identified and predictable applications for the teachings of those references. One of the most common implementations for hand-held communications devices was for use as video game controllers. Additionally, design incentives and market forces would have encouraged a person of ordinary skill in the art to adapt the teachings of those references to video gaming. According to one report, the video game industry in the United States reached $9.9 billion in 2004.[2]
- References disclosing these concepts teach the beneficial utility of them, including as cited in the claim charts submitted herewith. Defendants may rely upon the cited disclosures, among others, to show and illustrate the motivations to combine.

A person of ordinary skill in the art would have had a reasonable expectation of success in combining in the manner described above, as video games and the technological underpinnings behind them were well-known prior to 2004, as the Video Game References cited above confirm.

[2] *See* The NPD Group Reports Annual 2004 U.S. Video Game Industry Retail Sales, Archived web page, https://web.archive.org/web/20061125183902/http://www.npdfunworld.com/funServlet?nextpage=pr_body.html&content_id=2076 (last visited March 5, 2019).

Specific evidence of the motivation to combine includes the references and passages therein cited in the claim charts submitted herewith for the applicable claim limitations, which reflect the reasons and motivations to combine and modify listed above and additional reasons and motivations to combine and modify that Defendants may rely upon. Defendants also expect to rely on expert testimony regarding motivation to combine.

(2) "Communication device including a transmitter" References

Claims 1 and 27 of the '151 Patent, claims 44 and 48 of the '483 Patent, claims 32, 49, 50, 56, 63, and 72 of the '354 Patent, claims 1, 2, 9, 32, 49, 50, 56, 63, 72, 85, 89, 94, and 95 of the '325 Patent, and claim 45 of the '659 Patent recite limitations of a communication device or controller including a transmitter. For purposes of these Invalidity Contentions, prior art references that disclose a communication device or controller including a transmitter are "Communication device including a transmitter" references. While each reference that discloses any of the "Communication device including a transmitter" limitations as indicated in the claim charts submitted herewith is a "Communication device including a transmitter" reference, for convenience, the following is a non-exhaustive list of prior art references that are "Communication device including a transmitter" references:

- Howard '374
- Okamoto
- Eyestone
- Nishitani
- Rosenberg
- Cunningham

- Tremblay
- Immersion 3D Interaction Product Line
- Martin '812
- Daniel
- Choy
- Gombert
- Goodwin
- Deering
- Rolland
- Horton
- Kaplan
- Colmenarez
- French
- Harada
- Hinckley
- Hall
- Natoli
- Marvit
- Woolston
- Yamashita
- Endo
- McRae

- THRED
- InterSense IS-900
- DataGlove
- Weston

Nothing about these claim limitations adds anything non-obvious over the prior art. The features of communication devices or controllers including a transmitter were well-known in the art before the alleged invention of the Asserted Patents and are described in the disclosures of numerous references submitted and charted herewith. The claimed functionality is disclosed in the prior art cited herein, including the disclosures cited in the claim charts served herewith and within each of the foregoing identified references. Further, exemplary specific disclosures of the claimed functionality in the prior art, which disclose the applicable claim limitations and also reflect and illustrate the motivations to implement the claimed functionality and to modify and combine the teachings of the prior art to include the claimed functionality, are identified as follows:

- Daniel teaches that "[a]s the user squeezes and relaxes the pressure applied on the protrusions of input device 100, through pressure applied by the user's fingers and thumb, electronics embedded in the input device sense the change in position of the protrusions and generate commands transmitted to receiver." (Daniel, ¶ 33.)
- Choy describes that "a data glove or similar device would be applied to at least one hand of the user in order to track motion and to provide signals to the system for controlling advance of the stored visual scenario." (Choy, 2:58-64.)

- Goodwin teaches that the hand-held communication device "can be used by a user to provide input to a device, such as a computer, and can be used to provide force feedback from the computer to the user." (Goodwin, 7:28-34.)
- Cheng '277 teaches controllers that include wireless transmitters. *E.g.*, Cheng '277 at 3:16-28 ("With reference to FIG. 7, a third preferred embodiment of the present invention is shown. In this embodiment, the transmitting means of each of the control units (3J.4J) includes a wireless radio signal transmitter (T) which is connected electrically to the respective control button unit and which transmits wireless radio signals when the control buttons (32.J.42J) are operated. The controller further includes a wireless radio signal receiver (R) which receives the wireless radio signals from the wireless radio signal transmitter (T) and which is connected electrically to a connector (80J) that is adapted to be connected electrically to the processing unit of the video game console (82) via a receptacle (81J).").
- Marvit discloses a handheld device with a transmitter that can be used to wirelessly control remote devices: "Devices may be controlled by handheld device 10 through communications interface 20 of device 10 utilizing any of a number of wireless or wireline protocols, including cellular, Bluetooth and 802.11 protocols." (Marvit, ¶ 37).
- Björk describes a handheld device fixed with a proximity sensor. *E.g.*, Björk at 428 ("To determine the players [sic] physical whereabouts, we made use of short-range radio frequency (RF) proximity sensors. We placed sensors at a number of fixed locations in the game arena, marking virtual islands in the game world. We also

fitted each handheld computer with a similar proximity sensor, used to detect when the players are in proximity of islands (player-to-place proximity), or other players (players-to-player proximity)."). Björk also states that a proximity sensor "regularly transmit[s] a unique ID code in the free, unregulated ISM band." (Björk, p.426.)

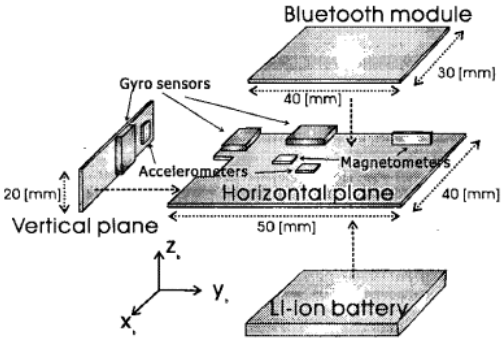
- Sati teaches "[t]he tasks of the procedure are invoked by the user 18 interacting with the system 10 via an interface sub-system 40. The user 18 includes position sensors 42 or user trackers, typically mounted on the user's 18 hand. These sensors 42 provide tracking of user's 18 position and orientation. Generally, a hand input device 44 with attached tracker 42 or an electroresistive sensing glove is used to report the flexion and abduction of each of the fingers, along with wrist motion. Thus, each task of the workflow is associated with hand gestures, the paradigm being gesturally-based hand gestures to indicate the desired operation." (Sati, ¶ 41.)

- Natoli states, "The VR glove is connected to the first processor through a second channel, which may be a wire, a wireless connection, a fiber optic, etc. for providing glove position signals to the first processor. The VR glove includes sensors for detecting the position and/or orientation of portions of the hand or hands of the user. As defined herein the term "position" of the VR glove refers to the direction and orientation of portions of the VR glove as well as a position, relative or absolute, of the VR glove and portions thereof as the VR glove is manipulated by the user, and also the configuration of the VR glove, including the aspects, bending, and lengths of the fingers of the user." (Natoli, 5:61-6:12.)

- Kaplan teaches "[o]ne embodiment of the present invention is a system for controlling the operation of an electronic device by a user. The system comprises at least two transmitters in communication with the electronic device. Each of the transmitters are adapted to be worn on the user's fingers. At least one receiver is configured to receive signals from the transmitters. A control module is in communication with the receiver and is configured to send control signals to said electronic device. Yet another embodiment is a system for controlling an electronic device. The system comprises at least two transmitters adapted to be worn on a user's fingers. At least three receivers are configured to receive a signal from the transmitters. A controller is configured to generate a control signal based, at least in part, on changes to a location of at least one of the transmitters. The controller is configured to calculate the location of each of the transmitters based on a distance of each of the transmitters measured from each of the receivers." (Kaplan, ¶¶ 14, 16.)

- Colmenarez states, "The present invention provides a system that comprises a hand-held device having a light emitting LED. The light emitting from the LED is detected in an image of the device captured by at least one digital camera. The detected position of the device in the 2D image is translated to corresponding coordinates on a display. The corresponding coordinates on the display may be used to locate a cursor, pointing device, or other movable feature. Thus, the system provides movement by the cursor, pointing device, or other movable feature on the display that corresponds to the movement of the hand-held device in the user's hand." (Colmenarez, ¶ 9.)

- Harada discloses "a portable orientation estimating device equipped with the bluetooth network module." (Harada, p.191.) Harada further discloses:



(Harada, p.191)

To the extent a prior art reference is argued or found not to disclose the limitations addressed in this section as recited in the Asserted Claims, and as an alternative to the teachings of that reference if it discloses the limitations, the claimed features would have been obvious to modify or combine with that reference for at least the following reasons in addition to the motivations to combine identified separately in these contentions:

- All elements of the claim are disclosed in the references with no change in their respective functions, and the combination would have yielded nothing more than predictable results.
- The advantages associated with this feature were well-known and would have been appreciated by persons of ordinary skill in the art, thereby motivating the usage of this feature to combine with or modify the teachings of other references. For example, the use of a hand-held communication device was known in the prior art would have been recognized as a convenient and efficient way for a user to transmit data to a remote processing system. Communication devices, which could provide

both input and output to the user were known in the prior art and were known to inherently contain a transmitter for sending input data and a receiver for receiving output data.

- References disclosing these concepts teach the beneficial utility of them, including as cited in the claim charts submitted herewith. Defendants may rely upon the cited disclosures, among others, to show and illustrate the motivations to combine.

A person of ordinary skill in the art would have had a reasonable expectation of success in combining in the manner described above, as communications devices that included transmitters were well-known prior to 2004, as the Communication device including a transmitter References cited above confirm.

Specific evidence of the motivation to combine includes the references and passages therein cited in the claim charts submitted herewith for the applicable claim limitations, which reflect the reasons and motivations to combine and modify listed above and additional reasons and motivations to combine and modify that Defendants may rely upon. Defendants also expect to rely on expert testimony regarding motivation to combine.

(3) "Receiver" References

Claims 1 and 27 of the '151 Patent, claims 44 and 48 of the '483 Patent, claims 32, 49, 50, 63, and 72 of the '354 Patent, claims 1, 32, 49, 50, 63, 72, 85, 87, 88, 89, 92, 93, and 94 of the '325 Patent, and claim 45 of the '659 Patent recite limitations of a communication device or controller including a receiver. For purposes of these Invalidity Contentions, prior art references that disclose a communication device or controller including a receiver are "Receiver" references. While each reference that discloses any of the "Receiver" limitations as indicated in the claim

charts submitted herewith is a "Receiver" reference, for convenience, the following is a non-exhaustive list of prior art references that are "Receiver" references:

- Howard '374
- Okamoto
- Eyestone
- Nishitani
- Rosenberg
- Cunningham
- Tremblay
- Immersion 3D Interaction Product Line
- Martin '812
- Daniel
- Goodwin
- Horton
- Kaplan
- Hall
- Woolston
- Yamashita
- Endo
- THRED
- InterSense IS-900
- Weston

Nothing about these claim limitations adds anything non-obvious over the prior art. The features of communication devices or controllers including a receiver were well-known in the art before the alleged invention of the Asserted Patents and are described in the disclosures of numerous references submitted and charted herewith. The claimed functionality is disclosed in the prior art cited herein, including the disclosures cited in the claim charts served herewith and within each of the foregoing identified references. Further, exemplary specific disclosures of the claimed functionality in the prior art, which disclose the applicable claim limitations and also reflect and illustrate the motivations to implement the claimed functionality and to modify and combine the teachings of the prior art to include the claimed functionality, are identified as follows:

- Daniel concerns a hand-held computer interactive device such that the "[i]nput device 100 transmits and receives signals through a response and communication system embedded within the input device in one embodiment." (Daniel, ¶ 34, Fig. 2.)
- Cheng '277 teaches a controller with wireless radio signal receiver. *E.g.*, Cheng '277 at 3:16-28 ("With reference to FIG. 7, a third preferred embodiment of the present invention is shown. In this embodiment, the transmitting means of each of the control units (3J.4J) includes a wireless radio signal transmitter (T) which is connected electrically to the respective control button unit and which transmits wireless radio signals when the control buttons (32.J.42J) are operated. The controller further includes a wireless radio signal receiver (R) which receives the wireless radio signals from the wireless radio signal transmitter (T) and which is connected electrically to a connector (80J) that is adapted to be connected

electrically to the processing unit of the video game console (82) via a receptacle (81J).").

- Björk describes a handheld device fixed with a proximity sensor. *E.g.*, Björk at 428 ("To determine the players [sic] physical whereabouts, we made use of short-range radio frequency (RF) proximity sensors. We placed sensors at a number of fixed locations in the game arena, marking virtual islands in the game world. We also fitted each handheld computer with a similar proximity sensor, used to detect when the players are in proximity of islands (player-to-place proximity), or other players (players-to-player proximity)."). Björk also states that "[w]hen a sensor mounted on a handheld device detects a signal from another device, a notification is sent to the game engine via the WLAN." (Björk, p.426)

To the extent a prior art reference is argued or found not to disclose the limitations addressed in this section as recited in the Asserted Claims, and as an alternative to the teachings of that reference if it discloses the limitations, the claimed features would have been obvious to modify or combine with that reference for at least the following reasons in addition to the motivations to combine identified separately in these contentions:

- All elements of the claim are disclosed in the references with no change in their respective functions, and the combination would have yielded nothing more than predictable results.
- The advantages associated with this feature were well-known and would have been appreciated by persons of ordinary skill in the art, thereby motivating the usage of this feature to combine with or modify the teachings of other references. For example, as discussed above, the use of a hand-held communication device was

known in the prior art and would have been recognized as a convenient and efficient way for a user to receive data from a remote processing system. Having a receiver on the communication device as described in the prior art provided the predictable benefit in the prior art of allowing a communication device to both transmit and receive signals.

- References disclosing these concepts teach the beneficial utility of them, including as cited in the claim charts submitted herewith. Defendants may rely upon the cited disclosures, among others, to show and illustrate the motivations to combine.

A person of ordinary skill in the art would have had a reasonable expectation of success in combining in the manner described above, as communications devices that included receivers were well-known prior to 2004, as the Receiver References cited above confirm.

Specific evidence of the motivation to combine includes the references and passages therein cited in the claim charts submitted herewith for the applicable claim limitations, which reflect the reasons and motivations to combine and modify listed above and additional reasons and motivations to combine and modify that Defendants may rely upon. Defendants also expect to rely on expert testimony regarding motivation to combine.

(4) "User input device" References

Claims 44 and 48 of the '483 Patent, claims 56, 63, and 72 of the '354 Patent, claims 1, 32, 49, 50, 56, 63, 72, 85, 89, and 94 of the '325 Patent, and claim 45 of the '659 Patent recite limitations of a communication device or controller including a user input device. For purposes of these Invalidity Contentions, prior art references that disclose a communication device or controller including a user input device are "User input device" references. While each reference that discloses any of the "User input device" limitations as indicated in the claim charts submitted

herewith is a "User input device" reference, for convenience, the following is a non-exhaustive list of prior art references that are "User input device" references:

- Howard '374
- Okamoto
- Eyestone
- Nishitani
- Rosenberg
- Cunningham
- Immersion 3D Interaction Product Line
- Martin '812
- Daniel
- Choy
- Gombert
- Goodwin
- Deering
- Horton
- Colmenarez
- French
- Hinckley
- Nichols
- Ohshima
- Salisbury

- Hall
- Natoli
- Marvit
- Woolston
- McRae
- Bouton '631
- Bouton '267
- Yamashita
- Endo
- THRED
- InterSense IS-900
- Weston

Nothing about these claim limitations adds anything non-obvious over the prior art. The features of communication devices or controllers including a user input device were well-known in the art before the alleged invention of the Asserted Patents and are described in the disclosures of numerous references submitted and charted herewith. The claimed functionality is disclosed in the prior art cited herein, including the disclosures cited in the claim charts served herewith and within each of the foregoing identified references. Further, exemplary specific disclosures of the claimed functionality in the prior art, which disclose the applicable claim limitations and also reflect and illustrate the motivations to implement the claimed functionality and to modify and combine the teachings of the prior art to include the claimed functionality, are identified as follows:

- Daniel describes "[t]he embodiments of the present invention provide a user input device that is held by a user, as opposed to being worn like a glove. The disclosed device is designed to capture data regarding a user's hand movements." (Daniel ¶ 32.)
- Choy discloses that "[p]referably the system includes input devices which have six degrees of freedom for orientation and positioning." (Choy, 3:7-9.)
- Goodwin teaches that the hand-held communication device "can be used by a user to provide input to a device, such as a computer, and can be used to provide force feedback from the computer to the user." (Goodwin, 7:28-34.) Goodwin further teaches "an apparatus that permits a user to select an object in a three-dimensional modeling environment. The apparatus includes a computer that supports a three-dimensional modeling environment application, an input device that provides user input to the computer, the input device having at least three degrees of freedom." (Goodwin, 4:4-33.)
- Gombert discloses "the object itself can be moved in accordance with the movement of the egg-shaped manual input device, or dedicated motion patterns of the input device can be caused to action parts of the virtual object." (Gombert, ¶ 7.)
- Horton teaches that "possible applications of the invention include guidance systems for the blind, robotic guidance systems, human tracking systems (e.g., prisoners), object tracking systems (e.g., parcel package, and/or auto), and

computer input devices for the handicapped (e.g., head or hand controlled input devices." (Horton, 2:62-67.)

- Cheng '277 teaches a controller with buttons. *E.g.*, Cheng '277 at 2:30-38 ("Each of the control units, 3 and 4, has a housing 30.40 with a finger operating surface 3141 which is provided with a control button unit and a bottom surface which is opposite to the finger operating surface 31,41. Each of the control button unit includes at least one control button 32.42. In the present embodiment, the control button unit of each of the control units 34 is shown to be provided with four control buttons 32,42.").
- Cheok discloses a handheld wand with input buttons. *E.g.*, Cheok at 439 ("Find the princess together with the other players: Next, the user was asked to transit from the AR stage into the VR stage by pressing a button on the wand and then together with the co-player find and rescue the witch.").
- Rosenberg discloses a force feedback interface featuring a user input device. Rosenberg 7:64-8:5 ("Microprocessor 26 can also receive commands from any other input devices included on interface apparatus 14 and provides appropriate signals to host computer 12 to indicate that the input information has been received and any information included in the input information. For example, buttons, switches, dials, or other input controls 39 on interface device 14 or user object 34 can provide signals to microprocessor 26."); Fig. 1.
- Marvit teaches a handheld device with motion detection and transmitter that allows to control remote devices via physical gestures. *E.g.*, Marvit at ¶ 6 ("Technical advantages of particular embodiments include the ability of a handheld device to

control various other local and remote devices through motion input of the handheld device. For example, gestures of the handheld device may be used to communicate commands to a device selected for control. Accordingly, motion input of one handheld device may be used to control a plurality of other devices thus facilitating control of the other devices for a user.").

- Sati teaches "The tasks of the procedure are invoked by the user 18 interacting with the system 10 via an interface sub-system 40. The user 18 includes position sensors 42 or user trackers, typically mounted on the user's 18 hand. These sensors 42 provide tracking of user's 18 position and orientation. Generally, a hand input device 44 with attached tracker 42 or an electroresistive sensing glove is used to report the flexion and abduction of each of the fingers, along with wrist motion. Thus, each task of the workflow is associated with hand gestures, the paradigm being gesturally-based hand gestures to indicate the desired operation." (Sati, ¶ 41.)
- Hinckley discloses a mouse with six degrees of freedom adapted for user input. *E.g.* Hinckley at 1:66-2:2 ("The present invention includes several inventive aspects related to computer input devices. One of these aspects is an input device with six degrees of freedom that can be slid across a non-active surface to control a cursor.")
- Ohshima teaches that "an interactive input device 102 is attached to a player's arm. The interactive input device 102 has a location/posture sensor 1021 for detecting the location and posture of a portion where the device 102 is attached, and a switch (trigger) 1022 that the player can turn on/off, and is used by the player to input commands by making predetermined actions." (Ohshima, 7:6-12).

To the extent a prior art reference is argued or found not to disclose the limitations addressed in this section as recited in the Asserted Claims, and as an alternative to the teachings of that reference if it discloses the limitations, the claimed features would have been obvious to modify or combine with that reference for at least the following reasons in addition to the motivations to combine identified separately in these contentions:

- All elements of the claim are disclosed in the references with no change in their respective functions, and the combination would have yielded nothing more than predictable results.
- The advantages associated with this feature were well-known and would have been appreciated by persons of ordinary skill in the art, thereby motivating the usage of this feature to combine with or modify the teachings of other references. For example, handheld user input devices were well known in the art before the alleged invention, including user input devices for video game systems, which included means for communications. User input devices generally were also widely known and used in the prior art, and the use of user input devices was well-known in the prior art to provide the convenience and ease of a means of allowing a user to input instructions or data to a remote processing system.
- References disclosing these concepts teach the beneficial utility of them, including as cited in the claim charts submitted herewith. Defendants may rely upon the cited disclosures, among others, to show and illustrate the motivations to combine.

A person of ordinary skill in the art would have had a reasonable expectation of success in combining in the manner described above, as communications devices that included user input devices were well-known prior to 2004, as the User input device References cited above confirm.

Specific evidence of the motivation to combine includes the references and passages therein cited in the claim charts submitted herewith for the applicable claim limitations, which reflect the reasons and motivations to combine and modify listed above and additional reasons and motivations to combine and modify that Defendants may rely upon. Defendants also expect to rely on expert testimony regarding motivation to combine.

(5) "User input device on exterior of controller" References

Claim 45 of the '659 Patent recites a limitation of a controller including a user input device on the exterior. For purposes of these Invalidity Contentions, prior art references that disclose a controller including a user input device on the exterior are "User input device on exterior of controller" references. While each reference that discloses any of the "User input device on exterior of controller" limitations as indicated in the claim charts submitted herewith is a "User input device on exterior of controller" reference, for convenience, the following is a non-exhaustive list of prior art references that are "User input device on exterior of controller" references:

- Howard '374
- Okamoto
- Eyestone
- Nishitani
- Rosenberg
- Cunningham
- Immersion 3D Interaction Product Line
- Martin '812

- Daniel
- Goodwin
- Deering
- Horton
- Colmenarez
- Hinckley
- Nichols
- Ohshima
- Hall
- Natoli
- Marvit
- Woolston
- Yamashita
- Endo
- InterSense IS-900
- Weston

Nothing about these claim limitations adds anything non-obvious over the prior art. The features of communication devices or controllers including a user input device on the exterior were well-known in the art before the alleged invention of the Asserted Patents and are described in the disclosures of numerous references submitted and charted herewith. The claimed functionality is disclosed in the prior art cited herein, including the disclosures cited in the claim charts served herewith and within each of the foregoing identified references. Further, exemplary specific

disclosures of the claimed functionality in the prior art, which disclose the applicable claim limitations and also reflect and illustrate the motivations to implement the claimed functionality and to modify and combine the teachings of the prior art to include the claimed functionality, are identified as follows:

- Daniel discloses both protrusions and buttons on the exterior of the user input device, allowing a user to manipulate the protrusions and buttons. (Daniel, ¶ 46.)
- Goodwin discloses a user input device including manipulatable joints on the exterior of the controller. (Goodwin, Fig. 1.)
- Deering teaches a button located on the exterior of the user input device which may be depressed to generate a new instance of an object on the graphical display. (Deering, pp. 226-227.)
- Cheng '277 teaches a controller with buttons. *E.g.*, Cheng '277 at 2:30-38 ("Each of the control units, 3 and 4, has a housing 30.40 with a finger operating surface 3141 which is provided with a control button unit and a bottom surface which is opposite to the finger operating surface 31,41. Each of the control button unit includes at least one control button 32.42. In the present embodiment, the control button unit of each of the control units 34 is shown to be provided with four control buttons 32,42.").
- Cheok discloses a handheld wand with input buttons. *E.g.*, Cheok at 439 ("Find the princess together with the other players: Next, the user was asked to transit from the AR stage into the VR stage by pressing a button on the wand and then together with the co-player find and rescue the witch.").

- Junichi discloses a game control unit with a controller featuring a user input device. Junichi at ¶ 50 ("As described above, in the position detection system 1 shown in FIG. 1, when the user pulls the trigger of the controller type imaging device 11 as the input device, image information and trigger are drawn from the controller type imaging device 11 And the trigger information indicating that it is transmitted to the game housing 10."); Fig. 1.
- Marvit teaches a user input device with a display, and it also discloses that "display 12 and input 14 may be combined into the same component, such as a touchscreen." (Marvit, ¶ 35).
- Hinckley discloses a mouse input device that includes buttons on its exterior:

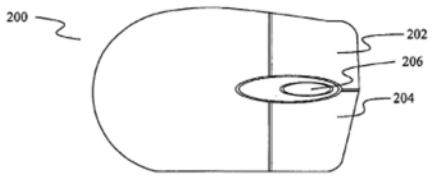


FIG. 2

(Hinckley, Fig.2)

- Colmenarez teaches a remote control device that features buttons on its exterior:

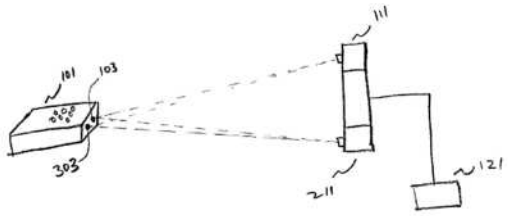


FIG 3

(Colmenarez, Fig.3)

To the extent a prior art reference is argued or found not to disclose the limitations addressed in this section as recited in the Asserted Claims, and as an alternative to the teachings

of that reference if it discloses the limitations, the claimed features would have been obvious to modify or combine with that reference for at least the following reasons in addition to the motivations to combine identified separately in these contentions:

- All elements of the claim are disclosed in the references with no change in their respective functions, and the combination would have yielded nothing more than predictable results.
- The advantages associated with this feature were well-known and would have been appreciated by persons of ordinary skill in the art, thereby motivating the usage of this feature to combine with or modify the teachings of other references. For example, as discussed above, the use of a user input device was known in the prior art. Moreover, the use of a user input device on the exterior of the controller was also known in the prior art. The use of a user input device on the exterior of a controller would have been recognized as a convenient and efficient means of allowing a user to input instructions or data to a remote processing system via manual input utilizing inputs on the exterior of the controller.
- References disclosing these concepts teach the beneficial utility of them, including as cited in the claim charts submitted herewith. Defendants may rely upon the cited disclosures, among others, to show and illustrate the motivations to combine.

A person of ordinary skill in the art would have had a reasonable expectation of success in combining in the manner described above, as communications devices that included user input devices on the outside/exterior of the controller were well-known prior to 2004, as the User input device on exterior of controller References cited above confirm.

Specific evidence of the motivation to combine includes the references and passages therein cited in the claim charts submitted herewith for the applicable claim limitations, which reflect the reasons and motivations to combine and modify listed above and additional reasons and motivations to combine and modify that Defendants may rely upon. Defendants also expect to rely on expert testimony regarding motivation to combine.

(6) "Output device providing sensory stimuli" References

Claims 1 and 32 of the '151 Patent, claims 44 and 48 of the '483 Patent, claims 32, 49, 50, 63, and 72 of the '354 Patent, claims 1, 32, 49, 50, 63, 72, 85, 89, and 94 of the '325 Patent, and claims 45 and 48 of the '659 Patent recite limitations of a communication device or controller including an output device providing sensory stimuli. For purposes of these Invalidity Contentions, prior art references that disclose a communication device or controller including an output device providing sensory stimuli are "Output device providing sensory stimuli" references. While each reference that discloses any of the "Output device providing sensory stimuli" limitations as indicated in the claim charts submitted herewith is a "Output device providing sensory stimuli" reference, for convenience, the following is a non-exhaustive list of prior art references that are "Output device providing sensory stimuli" references:

- Howard '374
- Okamoto
- Eyestone
- Nishitani
- Rosenberg
- Cunningham

- Tremblay
- Immersion 3D Interaction Product Line
- Martin '812
- Daniel
- Choy
- Goodwin
- Deering
- Horton
- Nichols
- Salisbury
- Hall
- Natoli
- Marvit
- Woolston
- Yamashita
- Endo
- Logitech Cordless Rumblepad
- Teletact
- DataGlove

Nothing about these claim limitations adds anything non-obvious over the prior art. The features of communication devices or controllers including an output device providing sensory stimuli were well-known in the art before the alleged invention of the Asserted Patents and are

described in the disclosures of numerous references submitted and charted herewith. The claimed functionality is disclosed in the prior art cited herein, including the disclosures cited in the claim charts served herewith and within each of the foregoing identified references. Further, exemplary specific disclosures of the claimed functionality in the prior art, which disclose the applicable claim limitations and also reflect and illustrate the motivations to implement the claimed functionality and to modify and combine the teachings of the prior art to include the claimed functionality, are identified as follows:

- Daniel teaches a communication device that may provide sensory stimuli output in the form of haptic feedback. Daniel discloses "a game console having a receiver configured to communicate with a handheld input device. Then, hand movements of a user are captured through the deformation of the input device by a user's hand. Next, the hand movements are translated to a command to be communicated to the receiver. Then, in response to the command being communicated to the receiver, the user's hand is stimulated with tactile feedback provided through the input device. The user's hand is stimulated by controlling a hardness and a pattern of a vibration applied to the user's hand." (Daniel, ¶ 16.)
- Choy teaches a communication device that may provide sensory stimuli output in the form of haptic feedback. Choy discloses the use of Cybertouch glove, which "features small vibrotactile stimulators on each finger. Each one of these stimulators can be programmed individually to vary the touch sensation, so that when the users hand it 'touching' an object in the virtual world, a pre-programmed actuation profile can be set in motion so that the stimulators would simulate the effect the object has on the user's fingers. The glove can also be programmed in

such a way so that the user feels that he is touching a solid object." (Choy, 6:54-64.)

- Goodwin teaches a communication device that may provide sensory stimuli output in the form of haptic feedback. Goodwin states that "[t]hose familiar with the haptic arts will recognize that there are many different haptic interfaces that convert the motion of an object under the control of a user to electrical signals, many different haptic interfaces that convert force signals generated in a computer to mechanical forces that can be experienced by a user, and haptic interfaces that accomplish both results." (Goodwin, 7:64-8:3.) Goodwin further discloses that "haptic input device 10 is also capable of providing haptic force feedback to the user in any one or more of all six degrees of freedom. In some embodiments, the haptic force feedback function provides yet another aid, namely a haptic aid, to the user. In some embodiments, the haptic force feedback device 10 provides dynamic frictional forces during a positional correspondence of the virtual object and the cursor in the two-dimensional display space, for example, to indicate the correspondence to the user." (Goodwin, 14:32-45.)
- Rosenberg discloses a force feedback interface featuring an output device outputting a force on the user object, conveying a sensation to the user. Rosenberg at 1:60-64 ("For example, when the user moves the manipulatable object and causes a displayed cursor to interact with a different displayed graphical object, the computer can issue a command that causes the actuator to output a force on the user object, conveying a feel sensation to the user.").

- Tremblay discloses tactile feedback communication device including an output device providing sensory stimuli. Tremblay at 2:39-58 ("The tactile sensation that a user feels is generated by a vibrotactile unit mounted on, or in functional relation to, a sensing body part of a user by a fastening means. In one embodiment, the vibrotactile device comprises a mass connected eccentrically to a mass-moving actuator shaft (i.e. the center of mass of the mass is offset from the axis of rotation). Energizing the mass-moving actuator causes the shaft to turn, which rotates the eccentric mass. This rotating mass causes a corresponding rotating force vector. A rapidly rotating force vector feels to the user as a vibration. A slowly rotating force vector feels like a series of individual impulses. For a small number of rapid rotations, the rotating force vector feels like a single impulse. We will use the term 'vibration' to denote a change in force vector (i.e., direction or magnitude). Examples of vibrations include, but are not limited to a single impulse, a sinusoidal force magnitude, and other functions of the force vector. We use the term 'tactile sensation' to refer to the feeling perceived by a user when their sensing body part experiences vibrations induced by a vibrotactile unit.").
- Marvit discloses an input device with a display that can provide sensory stimuli output in auditory, haptic, or visual form. Marvit states that "feedback may comprise an audio format, such as speech, a beep, a tone or music, a visual format, such as an indication on the device display, a vibratory format or any other suitable feedback format. Audio feedback may be provided through a user interface speaker or headphone jack of device 10, and vibratory feedback may be provided through a user interface vibration generation module of device 10. Audio, visual and

vibratory feedback may be varied to provide capability for multiple feedback indicators." (Marvit, ¶ 103).

- Salisbury describes a variety of haptic feedback mechanisms for providing sensory stimulus output. *E.g.* Salisbury at p.32 ("Display systems which attempt to convey information about contact utilize a variety of techniques. Shape changing displays (TiNi, 1990; Rheingold, 1991) convey the local shape of contact by controlled deformation or force exertion across an array of stimulators placed against the skin. Electrotactile and vibrotactile displays stimulate various cutaneous receptors by delivering energy (in the form of electric currents or vibrating mechanical displacement) in an attempt to evoke the sensations of contact (Bliss et al., 1963; Bach-y-Rita, 1982; Kaczmarek et al., 1991). One mode of tactile stimulation which has been relatively unexplored in the development of display systems is that of presenting the relative velocities between the fingers and objects which occur during slip. Conceivably, this could be accomplished by literally placing a moving surface (rotating a small ball, for example) under the fingertips. By careful control of the ball's motion and vibration, a variety of tactile sensations could be elicited.")
- Klitsner discloses that "[t]he controller outputs a first command signal to the audible output device that relates to a first selected input device. The controller then outputs a second command signal to the audible output device relating to a second selected input device when the first selected input device is actuated within a predetermined period of time."

To the extent a prior art reference is argued or found not to disclose the limitations addressed in this section as recited in the Asserted Claims, and as an alternative to the teachings

of that reference if it discloses the limitations, the claimed features would have been obvious to modify or combine with that reference for at least the following reasons in addition to the motivations to combine identified separately in these contentions:

- All elements of the claim are disclosed in the references with no change in their respective functions, and the combination would have yielded nothing more than predictable results.
- The advantages associated with this feature were well-known and would have been appreciated by persons of ordinary skill in the art, thereby motivating the usage of this feature to combine with or modify the teachings of other references. For example, handheld output devices for providing sensor stimuli were well known in the art before the alleged invention, including out output devices for video game systems, which included means for communications. In addition, output devices for providing sensory stimuli, such as sound or haptic feedback, were a well-known and conventional prior art infrastructure for providing sensory stimuli, which also would have obviously been used with movement, position, and orientation tracking and video game systems in order to provide well-known benefits and advantages such as increased immersion, entertainment, user experience, and feedback to the user.
- References disclosing these concepts teach the beneficial utility of them, including as cited in the claim charts submitted herewith. Defendants may rely upon the cited disclosures, among others, to show and illustrate the motivations to combine.

A person of ordinary skill in the art would have had a reasonable expectation of success in combining in the manner described above, as adapting a communications device or controller to

include an output devices providing sensory stimuli were well-known prior to 2004, as the Output device providing sensory stimuli References cited above confirm.

Specific evidence of the motivation to combine includes the references and passages therein cited in the claim charts submitted herewith for the applicable claim limitations, which reflect the reasons and motivations to combine and modify listed above and additional reasons and motivations to combine and modify that Defendants may rely upon. Defendants also expect to rely on expert testimony regarding motivation to combine.

(7) "Wireless" References

Claim 1 of the '151 Patent, claims 44 and 48 of the '483 Patent, claims 32, 49, and 50 of the '354 Patent, claims 1, 32, 49, 50, 63, 72, 85, 89, and 94 of the '325 Patent, and claim 45 of the '659 Patent recite limitations of a communication device or controller in wireless communication with a remote processing or host system. For purposes of these Invalidity Contentions, prior art references that disclose a communication device or controller in wireless communication with a remote processing or host system are "Wireless" references. While each reference that discloses any of the "Wireless" limitations as indicated in the claim charts submitted herewith is a "Wireless" reference, for convenience, the following is a non-exhaustive list of prior art references that are "Wireless" references:

- Howard '374
- Okamoto
- Eyestone
- Nishitani
- Rosenberg
- Cunningham

- Tremblay
- Martin '812
- Daniel
- Choy
- Goodwin
- Horton
- Colmenarez
- French
- Harada
- Hinckley
- Ohshima
- Hall
- Natoli
- Marvit
- Woolston
- Yamashita
- Endo
- InterSense IS-900
- Weston

Nothing about these claim limitations adds anything non-obvious over the prior art. The features of communication devices or controllers in wireless communication with a remote processing or host system were well-known in the art before the alleged invention of the Asserted

Patents and are described in the disclosures of numerous references submitted and charted herewith. The claimed functionality is disclosed in the prior art cited herein, including the disclosures cited in the claim charts served herewith and within each of the foregoing identified references. Further, exemplary specific disclosures of the claimed functionality in the prior art, which disclose the applicable claim limitations and also reflect and illustrate the motivations to implement the claimed functionality and to modify and combine the teachings of the prior art to include the claimed functionality, are identified as follows:

- Daniel describes that "[i]t will be apparent to one skilled in the art that the embedded electronics may generate short range radio signals. These signals can be processed in accordance with public or proprietary processing circuitry and/or software. For exemplary purposes, communication of the radio signals can be done using standards such as BLUETOOTH, or other suitable wireless technology (e.g., such as IEEE 802.11)." (Daniel, ¶ 33.)
- Choy describes a motion tracking system available in the prior art "called the Motion Star Wireless from Ascension Technologies. It is a wireless solution that can read up to 20 sensors in real time." (Choy, 5:48-51.)
- Goodwin teaches a haptic device connected for communication with the computer via wireless or an infrared interconnection. (Goodwin, 8:4-48.)
- Cheng '277 teaches a wireless controller. Cheng '277 at 3:16-28 ("With reference to FIG. 7, a third preferred embodiment of the present invention is shown. In this embodiment, the transmitting means of each of the control units (3J.4J) includes a wireless radio signal transmitter (T) which is connected electrically to the respective control button unit and which transmits wireless radio signals when the

control buttons (32.J.42J) are operated. The controller further includes a wireless radio signal receiver (R) which receives the wireless radio signals from the wireless radio signal transmitter (T) and which is connected electrically to a connector (80J) that is adapted to be connected electrically to the processing unit of the video game console (82) via a receptacle (81J).").

- Howard '632 teaches a wireless control device. Howard '632 at 2:49-51 ("It is still another object of the present invention to provide a wireless control device that will allow the user to comfortably and precisely control a pointing application.").
- Junichi discloses a game control unit that operates wirelessly. Junichi at ¶ 55 ("For example, the game apparatus 50 and the controller type imaging apparatus 60 can transmit and receive data by radio communication or wire communication.").
- Cunningham discloses a wireless haptic interface system. Cunningham at 28:36-38 ("In other embodiments, signals can be sent between electronic interface 410 and computer 210 by wireless transmission/reception.").
- Marvit discloses a wireless input device. Marvit at Abstract ("The device also includes a wireless interface operable to transmit the identified command to a remote receiver for delivery to the remote device.").
- Björk teaches a mixed reality video game involving devices linked via a wireless network. *E.g.*, Björk at 429-30 ("We have presented Pirates!, a multi-player computer game that is supported by proximity-sensing handheld devices in a wireless network, and provides a social game play experience in a physical environment.").

- Natoli teaches "[t]he VR glove is connected to the first processor through a second channel, which may be a wire, a wireless connection, a fiber optic, etc. for providing glove position signals to the first processor." (Natoli, 5:61-6:12.)
- Horton discloses "[i]n a preferred embodiment, data transceiver 140 is an infrared (IR) or other wireless transceiver capable of transmitting up to 4 Mb/s such as the Spectrix SpectrixLite data transceiver. A wireless transceiver is less cumbersome and does not interfere significantly with the user's movement. Generally, external tracking system 170 need only provide a 1 to 2 dimension position update 120 at a low frequency (e.g., 1 Hz) in order for tracking systems 15 on object 300 to function with sufficient accuracy. Thus, if sensor 140 is capable of operating at a higher frequency (e.g., 50-300 Hz) sensor 140 is unused for a large portion of time. During this free time, sensor 140 can be used for another purpose. For example, if sensor 140 is an IR data transceiver operating at 50-300 Hz, transceiver 140 can be used to transmit and receive simulation information 160 from simulation environment 180." (Horton, 9:10-25.)
- Colmenarez discloses "a wireless pointing system, and more particularly to a wireless pointing system that determines the location of a pointing device and maps the location into a computer to display a cursor or control a computer program." (Colmenarez, ¶ 2).

To the extent a prior art reference is argued or found not to disclose the limitations addressed in this section as recited in the Asserted Claims, and as an alternative to the teachings of that reference if it discloses the limitations, the claimed features would have been obvious to

modify or combine with that reference for at least the following reasons in addition to the motivations to combine identified separately in these contentions:

- All elements of the claim are disclosed in the references with no change in their respective functions, and the combination would have yielded nothing more than predictable results.
- The advantages associated with this feature were well-known and would have been appreciated by persons of ordinary skill in the art, thereby motivating the usage of this feature to combine with or modify the teachings of other references. For example, it would have been recognized as advantageous to provide user input and output from a communication handheld device to a remote processing system via wireless communication methods as known in the prior art. Wireless handheld communication devices generally were also widely known and used in the prior art, and the use of a wireless communication device instead of a wired communication device was well-known in the prior art to provide the convenience and ease of utilizing a handheld communication device from further locations, greater mobility, and without the burden of wires that may cause a hazard.
- References disclosing these concepts teach the beneficial utility of them, including as cited in the claim charts submitted herewith. Defendants may rely upon the cited disclosures, among others, to show and illustrate the motivations to combine.

A person of ordinary skill in the art would have had a reasonable expectation of success in combining in the manner described above, as the technological underpinnings behind wireless networking/transmission, and wireless devices adapting to communicate wirelessly, were well-known prior to 2004, as the Wireless references cited above confirm.

Specific evidence of the motivation to combine includes the references and passages therein cited in the claim charts submitted herewith for the applicable claim limitations, which reflect the reasons and motivations to combine and modify listed above and additional reasons and motivations to combine and modify that Defendants may rely upon. Defendants also expect to rely on expert testimony regarding motivation to combine.

(8) "Tracking and processing movement, position, and orientation" References

Claims 1, 28, and 32 of the '151 Patent, claims 44 and 48 of the '483 Patent, claims 32, 49, 50, 58, 62, 63, 64, and 73 of the '354 Patent, claims 1, 2, 3, 5, 7, 9, 10, 31, 32, 49, 50, 58, 64, 73, 85, 87, 88, 89, 92, 93, 94, 97, and 98 of the '325 Patent, and claims 45 and 48 of the '659 Patent recite limitations of a system that tracks and processes the movement, position, and/or orientation of communication device(s) or controller(s). For purposes of these Invalidity Contentions, prior art references that disclose a system that tracks and processes the movement, position, and/or orientation of communication device(s) or controller(s) are "Tracking and processing movement, position, and orientation" references. While each reference that discloses any of the "Tracking and processing movement, position, and orientation" limitations as indicated in the claim charts submitted herewith is a "Tracking and processing movement, position, and orientation" reference, for convenience, the following is a non-exhaustive list of prior art references that are "Tracking and processing movement, position, and orientation" references:

- Howard '374
- Okamoto
- Eyestone
- Nishitani

- Cunningham
- Tremblay
- Immersion 3D Interaction Product Line
- Martin '812
- Daniel
- Choy
- Gombert
- Goodwin
- Deering
- Rolland
- Horton
- Kaplan
- Colmenarez
- French
- Harada
- Hinckley
- Ohshima
- Salisbury
- Hall
- Natoli
- Woolston
- Yamashita

- Endo
- InterSense IS-900

Nothing about these claim limitations adds anything non-obvious over the prior art. The features of system that tracks and processes the movement, position, and/or orientation of communication device(s) or controller(s) were well-known in the art before the alleged invention of the Asserted Patents and are described in the disclosures of numerous references submitted and charted herewith. The claimed functionality is disclosed in the prior art cited herein, including the disclosures cited in the claim charts served herewith and within each of the foregoing identified references. Further, exemplary specific disclosures of the claimed functionality in the prior art, which disclose the applicable claim limitations and also reflect and illustrate the motivations to implement the claimed functionality and to modify and combine the teachings of the prior art to include the claimed functionality, are identified as follows:

- Daniel teaches that "[t]he game detects the user gripping the controls by a combination of fingertip pressure and finger flex information and then tracks the motion and/or orientation of the hand to interpret the manipulation of the physical controls." (Daniel, ¶ 43.)
- Choy describes a motion tracking system available in the prior art "called the Motion Star Wireless from Ascension Technologies. It is a wireless solution that can read up to 20 sensors in real time. This will allow the sensors to be positioned on the major limb segments (such as the upper arm, lower arm, hand, head, etc.) and be able to transmit the position and orientation of each of the segments to the PC with a high degree of accuracy. This kind of tracking is known as a 6DOF (Six Degrees of Freedom) tracker. In other words it will track 6 elements—The x, y &

z positions and the azimuth, elevation and roll of each of the sensors." (Choy, 4:59-5:57.)

- Gombert teaches of well-known methods for tracking and processing movement, position and orientation in the prior art. (Gombert, ¶¶ 5-8.) Gombert further discloses that the "invention relates to a manually actuated input device for commanding machine- and/or computer-assisted control operations for kinematic motions of a real or virtual multipart object, including a force/moment sensor with which linear displacements in the form of translational movements in the direction of three axes, each standing perpendicular on the other, of a three-dimensional rectangular system of coordinates and/or rotational excursions in the form of rotational motions about these three axes are sensed and converted into commanded motions of the object to be controlled." (Gombert, ¶ 2.)
- Goodwin discloses that "the input device has at least six degrees of freedom." (Goodwin, 1:59-2:12.)
- Deering discloses a system including a wand capable of tracking and processing both position and orientation movement. (Deering, pp. 228-229.)
- Rolland teaches various methods of movement, position and orientation tracking and processing including: "outside-in", "inside-out", methods of tracking, as well as beam scanning, spatial scan, GPS, videometric, mechanical gyroscope, accelerometer, mechanical, phase-difference, direct-field sensing, and hybrid systems. (Rolland, pp. 5-30.)

- Horton discloses a tracking processor reading acceleration data to calculate orientation and position. (Horton, 7:6-8:19.)
- Howard '632 describes a system that recognizes and tracks hand positions and orientations. *E.g.*, Howard '632 at 3:26-29 ("The present invention can also be used for gesture recognition, for example by combining time domain analysis of hand positions and orientations with image recognition capabilities."); 7:48-58 ("Gesture recognition capabilities can be made even more powerful by coupling the resolution of hand positions and orientations as described above with the resolution of hand motion. Hand motion can be resolved by using the optical pointing embodiment described above, or, where tracking of whole-hand motion is desired, by including gyroscopes, accelerometers, or other motion Sensors 40 or environmental Sensors 42 in device 10. By combining time-domain analysis of hand positions and orientations with time-domain analysis of hand motion, numerous image recognition processes are available for application in decoding gestures."); 9:41-50 ("For example, the device is capable of detecting finger position and orientation, individually, in combination, and relative to each other, Such as in turning a knob, the distance between the operator's fingertip and wrist, the angle of the hand at the wrist in the X- and y-directions, arm position in the X-, y-, and Z-directions, arm pitch, roll, and yaw, environmental and physiological conditions, voice input, two dimensional image inputs, Such as bar code readings, three dimensional image inputs, and numerous other types of input.").
- Ohshima teaches a system that detects the location and posture of a user's head and hand/arm. *E.g.*, Ohshima at 2:14-26 ("Also, a game apparatus according to the

present invention comprises: a first sensor for detecting a location/posture of a head of a player; a second sensor for detecting a location/posture of a hand or arm; means for estimating an action of the player on the basis of a relative location/posture of the hand or arm with respect to the location/posture of the head, which are detected by the first and second sensors; and means for outputting a player command corresponding to the estimated action."); 4:64-5:3 ("A magnetic sensor 100 as an example of a location/posture detection means is attached to the head of the user 1000, and a magnetic sensor 200 is also attached to a hand. The magnetic sensors output electrical signals including information of a three-dimensional location (x, y, z) and posture (roll, pitch, yaw) of the portions where they are attached."); 5:26-35 ("The location/posture measurement sections 2001a and 2001b convert electrical signals input from the location sensors 100 and 200 into six each coordinate values representing the locations/postures of the individual portions, and send them to the action analysis section 2002. The location/ posture measurement sections 2001a and 2001b have internal clocks to measure measurement times t in addition to the six each coordinate values of the locations/postures, and output the measured times to the action analysis section 2002.").

- Martin '812 discloses an apparatus and method for interfacing the motion of a user-manipulable object with a computer system, wherein the system tracks movement, position, and orientation. Martin '812 at 10:10-32 ("Sensors 52 can be, for example, relative optical encoders which provide signals to measure the angular rotation (i.e., rotational position) of a shaft of the transducer. The electrical outputs of the encoders are routed to electronic interface 16, as detailed with reference to

FIG. 9. Other types of sensors 52 can also be used, such as potentiometers, etc. In addition, it is also possible to use non-contact sensors at different positions relative to mechanical apparatus 14. For example, a Polhemus (magnetic) sensor can detect magnetic fields from objects; or, an optical sensor such as lateral effect photo diode includes an emitter/detector pair that detects positions of the emitter with respect to the detector in one or more degrees of freedom; for example, a photo diode by Hamamatsu Co., part S.1743, can be used. These types of sensors are able to detect the position of object 12 in particular degrees of freedom without having to be coupled to a joint of the mechanical apparatus. Alternatively, sensors can be positioned at other locations of relative motion or joints of mechanical apparatus 14. In addition, velocity sensors (e.g., tachometers) and acceleration sensors (e.g., accelerometers) can also be used instead of or in addition to position sensors."); 20:43-50 ("In the preferred embodiment, six degrees of freedom of user object 12 are sensed. Thus, both the position (x, y, z coordinates) and the orientation (roll, pitch, yaw) of the user object can be detected by computer 18 to provide a highly realistic simulation. In other embodiments, different mechanisms besides the floating gimbal mechanism 32 can be used to provide the fourth, fifth and sixth degrees of freedom; or fewer degrees of freedom can be provided.").

- Sati teaches "[t]he tasks of the procedure are invoked by the user 18 interacting with the system 10 via an interface sub-system 40. The user 18 includes position sensors 42 or user trackers, typically mounted on the user's 18 hand. These sensors 42 provide tracking of user's 18 position and orientation. Generally, a hand input device 44 with attached tracker 42 or an electroresistive sensing glove is used to

report the flexion and abduction of each of the fingers, along with wrist motion. Thus, each task of the workflow is associated with hand gestures, the paradigm being gesturally-based hand gestures to indicate the desired operation." (Sati, ¶ 41.)

- Colmenarez discloses a remote control system that involves tracking movement, position, and orientation. *E.g.*, Colmenarez at ¶ 51 ("FIG. 3 depicts a third embodiment of the present invention that incorporates at least two cameras 111, 211 (as in the second embodiment), and at least two LEDs 103, 303 in the hand-held device 101. The addition of at least one more LED into the hand-held device 101 enables the system to calculate all six degrees of motion (three translation and three rotational). The three translation degrees of motion are detected and mapped from the image space to the display space as in the second embodiment described above, and will thus not be repeated here.")
- Hinckley teaches that "translational movement of the input device is detected using image correlation in which two images are compared to each other to determine movement of the input device. The other degrees of freedom (rotation, tilting, and lifting) are calculated via a three-dimensional position algorithm." (Hinckley, 2:13-18).

To the extent a prior art reference is argued or found not to disclose the limitations addressed in this section as recited in the Asserted Claims, and as an alternative to the teachings of that reference if it discloses the limitations, the claimed features would have been obvious to modify or combine with that reference for at least the following reasons in addition to the motivations to combine identified separately in these contentions:

- All elements of the claim are disclosed in the references with no change in their respective functions, and the combination would have yielded nothing more than predictable results.
- The advantages associated with this feature were well-known and would have been appreciated by persons of ordinary skill in the art, thereby motivating the usage of this feature to combine with or modify the teachings of other references. For example, sensors that can track six degrees of freedom (changes in movement/position forward/backward (surge), up/down (heave), left/right (sway) translation in three perpendicular axes, combined with changes in orientation through rotation about three perpendicular axes, yaw (normal axis), pitch (transverse axis), and roll (longitudinal axis)) were well known in the art before the alleged invention. In addition, handheld communication devices containing sensors for tracking six degrees of freedom were also well known in the art before the alleged invention. The use of sensors, which can track and process six degrees of freedom, was well-known in the prior art to provide a predictable, convenient and efficient way of increased tracking, immersion, feedback to the to the user of their movements.
- References disclosing these concepts teach the beneficial utility of them, including as cited in the claim charts submitted herewith. Defendants may rely upon the cited disclosures, among others, to show and illustrate the motivations to combine.

A person of ordinary skill in the art would have had a reasonable expectation of success in combining in the manner described above, as tracking and processing movement, position, and

orientation, and the technological underpinnings behind them were well-known prior to 2004, as the Tracking and processing movement, position, and orientation References cited above confirm.

Specific evidence of the motivation to combine includes the references and passages therein cited in the claim charts submitted herewith for the applicable claim limitations, which reflect the reasons and motivations to combine and modify listed above and additional reasons and motivations to combine and modify that Defendants may rely upon. Defendants also expect to rely on expert testimony regarding motivation to combine.

(9) "Tracking and processing movement relative to the other communication device" References

Claim 27 of the '151 Patent and claim 6 of the '325 Patent recite limitations of a system that tracks and processes the movement of a second communication device relative to the movement of a first communication device. For purposes of these Invalidity Contentions, prior art references that disclose a system that tracks and processes the movement of a second communication device relative to the movement of a first communication device are "Tracking and processing movement relative to the other communication device" references. While each reference that discloses any of the "Tracking and processing movement relative to the other communication device" limitations as indicated in the claim charts submitted herewith is a "Tracking and processing movement relative to the other communication device" reference, for convenience, the following is a non-exhaustive list of prior art references that are "Tracking and processing movement relative to the other communication device" references:

- Nishitani
- Tremblay
- Nichols

- Natoli
- Marvit
- Woolston
- Weston

Nothing about these claim limitations adds anything non-obvious over the prior art. The features of system that tracks and processes the movement of a second communication device relative to the movement of a first communication device were well-known in the art before the alleged invention of the Asserted Patents and are described in the disclosures of numerous references submitted and charted herewith. The claimed functionality is disclosed in the prior art cited herein, including the disclosures cited in the claim charts served herewith and within each of the foregoing identified references. Further, exemplary specific disclosures of the claimed functionality in the prior art, which disclose the applicable claim limitations and also reflect and illustrate the motivations to implement the claimed functionality and to modify and combine the teachings of the prior art to include the claimed functionality, are identified as follows:

- Ohshima teaches a system that tracks the absolute location and posture of a user's head and hand and the relative position of the hand to the head. *E.g.*, Ohshima at 2:14-26 ("Also, a game apparatus according to the present invention comprises: a first sensor for detecting a location/posture of a head of a player; a second sensor for detecting a location/posture of a hand or arm; means for estimating an action of the player on the basis of a relative location/posture of the hand or arm with respect to the location/posture of the head, which are detected by the first and second sensors; and means for outputting a player command corresponding to the estimated

action."); 5:36-60 ("The action analysis section 2002 analyzes an action in consideration of not only the absolute locations/postures of the head and hand but also their relative location/posture. This is for the following reason. That is, a person normally expresses his or her own intention by actions of a plurality of body portions. In other words, when the location/posture of only one portion are detected and the user's intention is estimated based on them, many errors are produced even when the detected location/posture have high precision. For example, as for a forward stretching action of the arm, a forward stretching action of the arm with the head facing forward has a meaning different from that with the head facing another direction. For example, if the action "to stretch the arm forward" means "attack', since attack is normally done with the player's head facing the target (i.e., in the stretching direction of the arm), the player may intend an action other than attack if he or she stretched the arm with the head facing another direction. Hence, if no posture is taken into consideration, a forward stretching action of the arm with the head facing another direction is highly likely to be erroneously recognized as attack. For this reason, in this embodiment, the estimation precision of the users intention is improved by taking relative location/posture (e.g., the location/posture of the hand relative to those of the head) into consideration.").

- Latypov concerns a system for determining the position and orientation of users playing interactive computer games, wherein the system tracks the movement and position of multiple communication devices relative to each other. Latypov at 6:52-59 ("Means for determining angles between segments 2 are sensors 4 intended for tracking position of segments and their parts relative to one another and arranged

at places of articulations 3 of segments 2 and at segments 2 proper. They are intended for accurate tracking of the user's movements, inclusive of measuring the rotation angles of some segments relative to their axis, for example, of one end of a shoulder segment relative to its other end."); Fig. 1; Abstract ("Sensors 4 for tracking angular position of segments 2 of the user's locomotor system are attached at places of articulations 3 of segments 2 and at certain segments 2 proper. At least at one of segments 2 arranged are main means 5 for determination of reference directions, which means provide determination of orientation of a given segment relative to the reference directions. Data from sensors 4, means 5 for determination of reference directions and, when necessary, from devices 8 of interaction of a user with the virtual space objects are processed for determination of the user's orientation and position as a whole on the basis of particular values of angles between segments, and orientation of a main segment whereat means for determination of reference directions, relative to the reference directions, are arranged. Obtained data are used for displaying user's movements in real time, or representation for a user of virtual space that corresponds to his/her viewing field that varies according to movements in real space."); 1:20-25 ("Known are systems for tracking and displaying person's body positions in motion, which use mechanical means to track positions of a head and body parts-goniometers intended to measure angles of rotation of joints and determine final positions, e.g. of an arm relative to a body, or a finger tip relative to a hand."); 2:17-23 ("Also known are systems having sensors of determination of the relative motion parameters, advantages of which systems consist in simplicity and compactness. 'Gloves' used

in systems of immersion in Virtual reality and having sensors measuring some or all finger joints rotation angles, may be referred to as examples of such systems.").

- Tremblay discloses a tactile feedback man-machine interface wherein movement of a user's body part is measured relative to another body part. Tremblay at 3:30-44 ("The physical state signal is measured from physical state variables. These variables have relevance to the physical state of a body part of the user or the user's physical environment. The physical state variables includes any measurable parameter in the environment or any measurable parameter relating to a body part of the user. Some examples of measurable physical parameters in an environment include but are not restricted to, the state of a body part, the position of objects in the environment, the amount of energy imparted to an object in the environment, the existence of an object or objects in the environment, the chemical state of an object, the temperature in the environment, and the like. The state of a body part may include the physical position, velocity, or acceleration of the body part relative to another body part or relative to a point in the environment.").
- Hinckley discloses, "The techniques under these embodiments use the absolute rotation of the mouse pad relative to the mouse to counter-rotate the (x, y) translational motion samples, so that cursor motion always corresponds to hand motion in an intuitive manner, even when the mouse pad is upside down, for example." (Hinckley, 13:26-31.)
- Natoli describes a motion-sensitive input glove which can contains sensors including "magnets, accelerometers, or other mechanisms for detecting the relative movement of positions of the hand of the user." (Natoli, 17:49-52.)

- Marvit discloses a user input device that detects physical gestures by sensing movement, position, and orientation. Marvit at ¶ 44 ("In the illustrated embodiment, accelerometer 24 *a* comprises an x-axis accelerometer that detects movement of the device along an x-axis, accelerometer 24 *b* comprises a y-axis accelerometer that detects movement of the device along a y-axis and accelerometer 24 *c* comprises a z-axis accelerometer that detects movement of the device along a z-axis. In combination, accelerometers 24 *a*, 24 *b* and 24 *c* are able to detect rotation and translation of device 10. As indicated above, rotation and/or translation of device 10 may serve as an input from a user to operate the device.").

To the extent a prior art reference is argued or found not to disclose the limitations addressed in this section as recited in the Asserted Claims, and as an alternative to the teachings of that reference if it discloses the limitations, the claimed features would have been obvious to modify or combine with that reference for at least the following reasons in addition to the motivations to combine identified separately in these contentions:

- All elements of the claim are disclosed in the references with no change in their respective functions, and the combination would have yielded nothing more than predictable results.
- The advantages associated with this feature were well-known and would have been appreciated by persons of ordinary skill in the art, thereby motivating the usage of this feature to combine with or modify the teachings of other references. For example, as discussed above, sensors which can track six degrees of freedom were well known in the art before the alleged invention. In addition, as discussed below, the use of a second communication device was well known in the art before the

alleged invention. The use of sensors on multiple communication devices, which can independently track and process six degrees of freedom, as well as track and process the communication devices relative to one another was well-known in the prior art to provide a predictable, convenient and efficient way of increased tracking, reducing latency and/or bandwidth, and utilize gestures using multiple hands.

- References disclosing these concepts teach the beneficial utility of them, including as cited in the claim charts submitted herewith. Defendants may rely upon the cited disclosures, among others, to show and illustrate the motivations to combine.

A person of ordinary skill in the art would have had a reasonable expectation of success in combining in the manner described above, as tracking and processing movement, position, and orientation relative to another communication device, and the technological underpinnings behind them were well-known prior to 2004, as the Tracking and processing movement relative to the other communication device References cited above confirm.

Specific evidence of the motivation to combine includes the references and passages therein cited in the claim charts submitted herewith for the applicable claim limitations, which reflect the reasons and motivations to combine and modify listed above and additional reasons and motivations to combine and modify that Defendants may rely upon. Defendants also expect to rely on expert testimony regarding motivation to combine.

(10) "Accelerometer" References

Claims 1, 63, and 94 of the '325 Patent, and claims 45 and 46 of the '659 Patent recite limitations of a communication device or controller including an accelerometer. For purposes of these Invalidity Contentions, prior art references that disclose a communication device or

controller including an accelerometer are "Accelerometer" references. While each reference that discloses any of the "Accelerometer" limitations as indicated in the claim charts submitted herewith is a "Accelerometer" reference, for convenience, the following is a non-exhaustive list of prior art references that are "Accelerometer" references:

- Howard '374
- Okamoto
- Eyestone
- Nishitani
- Rosenberg
- Cunningham
- Tremblay
- Immersion 3D Interaction Product Line
- Martin '812
- Gombert
- Rolland
- Horton
- Harada
- Hall
- Natoli
- Marvit
- Woolston
- Yamashita

- Endo
- THRED
- InterSense IS-900
- DataGlove

Nothing about these claim limitations adds anything non-obvious over the prior art. The features of communication devices or controllers including an accelerometer were well-known in the art before the alleged invention of the Asserted Patents and are described in the disclosures of numerous references submitted and charted herewith. The claimed functionality is disclosed in the prior art cited herein, including the disclosures cited in the claim charts served herewith and within each of the foregoing identified references. Further, exemplary specific disclosures of the claimed functionality in the prior art, which disclose the applicable claim limitations and also reflect and illustrate the motivations to implement the claimed functionality and to modify and combine the teachings of the prior art to include the claimed functionality, are identified as follows:

- Howard '632 teaches a control device with a motion detector sensor, such as an accelerometer. Howard '632 at 3:22-25 ("The housing may also optionally include a motion detector, Such as an accelerometer or gyroscope, an environmental condition Sensor, or a voice recognition Sensor.").
- Ohshima teaches that the location/posture detection means includes sensors that provide 3D location and posture. Ohshima at 4:64-5:3 ("A magnetic sensor 100 as an example of a location/posture detection means is attached to the head of the user 1000, and a magnetic sensor 200 is also attached to a hand. The magnetic sensors

output electrical signals including information of a three-dimensional location (x, y, z) and posture (roll, pitch, yaw) of the portions where they are attached.").

- Rosenberg discloses a force feedback interface featuring an accelerometer. Rosenberg at 8:35-44 ("An example of sensors suitable for several embodiments described herein are digital optical encoders, which sense the change in position of an object about a rotational axis and provide digital signals indicative of the change in position. A suitable optical encoder is the 'Softpot' from U.S. Digital of Vancouver, Wash. Linear optical encoders, potentiometers, optical sensors, Velocity sensors, acceleration sensors, strain gauge, or other types of sensors can also be used, and either relative or absolute sensors can be provided.").
- Gombert describes an input device known in the prior art for controlling a virtual object. "The input device used for this purpose is based on the principle of an accelerometer which recognizes accelerations and patterns thereof from the motions implemented in predefined patterns of the complete manual input device in allocating a motion characteristic assigned to each acceleration or pattern to the object shown in the display." (Gombert, ¶¶ 6-8.)
- Rolland teaches the use of an accelerometer in the prior art for use in position and orientation tracking. (Rolland, p. 15.)
- Horton discloses that "two accelerometer mounting points 301 and 302 are located on object 300 (e.g., two locations on a head-mounted display (HMD) unit, or two locations on the wrist of a data glove). Object 300 may be, for example, a head-mounted display unit, a wristband/data glove, or other similar device attached to a user to monitor the user's movement." (Horton, 5:7-13.) Horton further describes

that "tracking processor 40 reads 44 acceleration data 35 from each accelerometer 1-6. Accelerometer bias and scaling factors 50 are applied 62 to acceleration data 44. Acceleration corrections 120 from feedback loop 89 are also applied 62 to acceleration data 44. Gravity and centripetal components of acceleration are also removed 64 from corrected acceleration data 62." (Horton, 7:6-8:19.) Horton further discloses "[t]he invention is a three-dimensional position and orientation tracking system that uses accelerometers to measure acceleration in the six-degrees of freedom (e.g., x, y, z position coordinates and roll, pitch, yaw orientation components) of a moveable object (e.g., a head-mounted display unit, or a wristband/data glove). Conventional accelerometers, as used herein, measure acceleration in one linear direction (e.g., x, y, z, or combination thereof, coordinate axis), but may report acceleration data as a nonlinear function of, for example, acceleration or time. Acceleration data on the moveable object is periodically (e.g., 50-300 Hz) received by a tracking processor. The tracking processor generates both position and orientation information on the object relative to a simulation environment as a function of the acceleration data. Accelerometers are easily integrated into electronic componentry (e.g., using silicon chip technology). Thus, the tracking system of the present invention can be embodied in a small, lightweight unit that is easily attached to a human user without significant interference to natural body movements." (Horton, 2:15-35.)

- Natoli teaches an "embodiment of the disclosed VR keyboard system and method using sensors to detect hand positions of a user without a VR glove. The sensors

may include magnets, accelerometers, or other mechanisms for detecting the relative movement of positions of the hand of the user." (Natoli, 17:47-52.)

- Marvit describes a user input device containing three accelerometers. Marvit at ¶ 43 ("Accelerometers 24 a, 24 b and 24 c detect movement of the device by detecting acceleration along a respective sensing axis. A particular movement of the device may comprise a series, sequence or pattern of accelerations detected by the accelerometers.").
- Harada discloses an orientation tracking device that "consists of accelerometers, magnetometers, gyro sensors, a microprocessor, a bluetooth network module and a Li-ion battery." (Harada, p.194).

To the extent a prior art reference is argued or found not to disclose the limitations addressed in this section as recited in the Asserted Claims, and as an alternative to the teachings of that reference if it discloses the limitations, the claimed features would have been obvious to modify or combine with that reference for at least the following reasons in addition to the motivations to combine identified separately in these contentions:

- All elements of the claim are disclosed in the references with no change in their respective functions, and the combination would have yielded nothing more than predictable results.
- The advantages associated with this feature were well-known and would have been appreciated by persons of ordinary skill in the art, thereby motivating the usage of this feature to combine with or modify the teachings of other references. For example, accelerometers were well known in the art before the alleged invention. In addition, hand-held communication devices containing accelerometers, were a

well-known and conventional prior art infrastructure for providing movement, position, and orientation tracking, which also would have obviously been used video game systems in order to provide well-known benefits and advantages such as increased accuracy and tracking.

- References disclosing these concepts teach the beneficial utility of them, including as cited in the claim charts submitted herewith. Defendants may rely upon the cited disclosures, among others, to show and illustrate the motivations to combine.

A person of ordinary skill in the art would have had a reasonable expectation of success in combining in the manner described above, as communications devices that included accelerometers were well-known prior to 2004, as the Accelerometer References cited above confirm.

Specific evidence of the motivation to combine includes the references and passages therein cited in the claim charts submitted herewith for the applicable claim limitations, which reflect the reasons and motivations to combine and modify listed above and additional reasons and motivations to combine and modify that Defendants may rely upon. Defendants also expect to rely on expert testimony regarding motivation to combine.

(11) "Memory" References

Claims 45 and 46 of the '659 Patent recite limitations of a communication device or controller including memory. For purposes of these Invalidity Contentions, prior art references that disclose a communication device or controller including memory are "Memory" references. While each reference that discloses any of the "Memory" limitations as indicated in the claim charts submitted herewith is a "Memory" reference, for convenience, the following is a non-exhaustive list of prior art references that are "Memory" references:

- Howard '374
- Eyestone
- Nishitani
- Rosenberg
- Cunningham
- Horton
- Kaplan
- Natoli
- Marvit
- Woolston
- Yamashita
- Endo

Nothing about these claim limitations adds anything non-obvious over the prior art. The features of communication devices or controllers including memory were well-known in the art before the alleged invention of the Asserted Patents and are described in the disclosures of numerous references submitted and charted herewith. The claimed functionality is disclosed in the prior art cited herein, including the disclosures cited in the claim charts served herewith and within each of the foregoing identified references. Further, exemplary specific disclosures of the claimed functionality in the prior art, which disclose the applicable claim limitations and also reflect and illustrate the motivations to implement the claimed functionality and to modify and combine the teachings of the prior art to include the claimed functionality, are identified as follows:

- Rosenberg discloses a force feedback interface featuring a communication device including a memory. Rosenberg at 13: 42-47 ("The microprocessor can store such a spatial representation in memory 27. The microprocessor thus can determine, independently of the host computer, at what positions the user object is interacting with a graphical object having forces associated with it, and thus will know when to output force signals to actuators 30.").
- Natoli teaches that a processor may be worn or mounted on the user. Natoli further teaches that the "processor may include a microprocessor such as a "PENTIUM" microprocessor with memory, such as about 16 MB of RAM for executing the VR program. The first processor may be a desktop personal computer (PC), a workstation, or a portable or laptop computer. For example, the first processor may be worn or mounted on the user; for example, on a belt about the waist of the user as the user wears the VR headset." (Natoli, 5:53-60.)
- Rosenberg teaches that "[l]ocal memory 27, such as RAM and/or ROM, is preferably coupled to microprocessor 26 in interface device 14 to store instructions for microprocessor 26 and store temporary and other data." (Rosenberg, 10:27-30.)
- Horton teaches, "Memory unit 37 is coupled to tracking processor 40 and is used for storing program instruction steps and storing data for execution by tracking processor 40. Memory unit 37 is a conventional computer memory unit such as a magnetic hard disk storage unit or random access memory (RAM) on a chip. Output from tracking processor 40 is position and orientation information 130." (Horton, 4:40-46.)

- Kaplan discloses a "mobile transceivers 710 and 715. For mobile transceiver 710, transceiver 712 is connected to memory storage device. For mobile transceiver 715, transceiver 717 is connected to memory storage device. When an initiation signal is received by mobile transceiver 710, transceiver 712 transmits the unique identifier stored in memory storage device 711. When an initiation signal is received by mobile transceiver 715, transceiver 717 transmits the unique identifier stored in memory storage device 716." (Kaplan, ¶ 77.)
- Marvit teaches a handheld user input device containing "a display 12, input 14, processor 16, memory 18, communications interface 20 and motion detector 22." (Marvit, ¶ 35).

To the extent a prior art reference is argued or found not to disclose the limitations addressed in this section as recited in the Asserted Claims, and as an alternative to the teachings of that reference if it discloses the limitations, the claimed features would have been obvious to modify or combine with that reference for at least the following reasons in addition to the motivations to combine identified separately in these contentions:

- All elements of the claim are disclosed in the references with no change in their respective functions, and the combination would have yielded nothing more than predictable results.
- The advantages associated with this feature were well-known and would have been appreciated by persons of ordinary skill in the art, thereby motivating the usage of this feature to combine with or modify the teachings of other references. For example, using memory in conjunction with a processor was well known in the art before the alleged invention. In addition, memory was a well-known and

conventional prior art infrastructure for storing and running a set of programs instruction or user data, which also would have obviously been used in hand-held communication systems in order to provide well-known benefits and advantages such as increased processing, user configuration, and reduction of latency.

- References disclosing these concepts teach the beneficial utility of them, including as cited in the claim charts submitted herewith. Defendants may rely upon the cited disclosures, among others, to show and illustrate the motivations to combine.

A person of ordinary skill in the art would have had a reasonable expectation of success in combining in the manner described above, as communications devices that included memory/data storage were well-known prior to 2004, as the Memory References cited above confirm.

Specific evidence of the motivation to combine includes the references and passages therein cited in the claim charts submitted herewith for the applicable claim limitations, which reflect the reasons and motivations to combine and modify listed above and additional reasons and motivations to combine and modify that Defendants may rely upon. Defendants also expect to rely on expert testimony regarding motivation to combine.

(12) "Calibration/configuration" References

Claims 44 and 48 of the '483 Patent, claims 57, 63, and 72 of the '354 Patent, claims 17, 48, 54, 57, 69, 72, 82, 91, and 105 of the '325 Patent recite limitations of a communication device including a user input device for calibrating or configuring the communication device to establish a reference position or for calibrating the system. For purposes of these Invalidity Contentions, prior art references that disclose a communication device a user input device for calibrating or configuring the communication device to establish a reference position or for calibrating the system are "Calibration/configuration" references. While each reference that discloses any of the

"Calibration/configuration" limitations as indicated in the claim charts submitted herewith is a "Calibration/configuration" reference, for convenience, the following is a non-exhaustive list of prior art references that are "Calibration/configuration" references:

- Eyestone
- Nishitani
- Daniel
- Gombert
- Goodwin
- Deering
- Horton
- Kaplan
- Colmenarez
- Hinckley
- Natoli
- Marvit
- Woolston
- Yamashita
- Bouton '631
- Bourton '267
- Cartabiano
- Glynn

Nothing about these claim limitations adds anything non-obvious over the prior art. The features of communication devices or controllers including a user input device for calibrating or configuring the communication device to establish a reference position or for calibrating the system were well-known in the art before the alleged invention of the Asserted Patents and are described in the disclosures of numerous references submitted and charted herewith. The claimed functionality is disclosed in the prior art cited herein, including the disclosures cited in the claim charts served herewith and within each of the foregoing identified references. Further, exemplary specific disclosures of the claimed functionality in the prior art, which disclose the applicable claim limitations and also reflect and illustrate the motivations to implement the claimed functionality and to modify and combine the teachings of the prior art to include the claimed functionality, are identified as follows:

- Natoli teaches a user input device adapted to provide configuration data. For example, Natoli discloses "[t]he disclosed VR keyboard system and method displays a predetermined set of VR keys and/or a predetermined VR keyboard layout for interaction with a specified user. The user may be specified by a name, an identification number, a password, a biometric characteristic, etc." (Natoli, 12:5-12.) Natoli further discloses, "[s]uch positioning and use of the VR gloves corresponds to how the specific user interacts with a keyboard, whether an actual keyboard or a VR keyboard, and such positioning and use may be sufficiently unique to the specific user in the positioning, orientation, and aspects of the hands, in the mannerisms of the user during typing, in the speed and reaction response times, etc. Accordingly, hand positioning during typing may function as a biometric uniquely associated with the user." (Natoli, 12:32-40.)

- Mishra teaches that "[c]alibration of the input devices 102A, 102B may be performed once by the manufacturer when expected energy levels based on possible positions are generated and stored in the set-top box 101. For example, the input devices 102A, 102B may be positioned at different known distances and angles with respect to the set-top box 101. Amplitudes of the received signals are measured and stored in a calibration table for later use." (Mishra, 4:62-5:2.) Mishra further discloses, "The program 112 may know about the existence of the wireless input devices based on configuration information stored in the set-top box 101. In further embodiments, additional wireless input devices may be dynamically added to the system 100. For example, when a new input device is added to the system 100, it may transmit its ID along with other information, such as the device's serial number or other identification information. When the control program 112 detects the new ID and/or other information, the program 112 may add the input device as an active device." (Mishra, 5:55-64.)
- Colmenarez teaches "[w]hen the training routine is engaged by the user, for example, the instructions may direct the user to hold the hand-held device at a certain distance directly in front of the camera 111 and initiate flashing of the LED 103. The control unit 121 records the flashing frequency or pattern of the device 101 from successive images. It may also record the wavelength and/or image profile of the hand-held device 101. This data may then be used by the control unit 121 thereafter in the recognition and tracking of the hand-held device 101." (Colmenarez, ¶ 35.)

- Daniel teaches "[a] display monitor connected to a computer, or game unit, allows the user to view the interactions. To begin, the user can touch the four corners of the sheet, which calibrates the positional tracking. For example, the four corners of the sheet can be marked with red crosses to indicate the areas to be touched." (Daniel, ¶ 43.)
- Horton teaches a calibration mode of operation. Horton further discloses, "Accelerometer initialization and calibration 48 is initiated prior to each system use to correct for the bias and scaling factors of the accelerometers due to such factors as time, temperature, mechanical jarring and the like. Accelerometers 1-6 are initialized 48 by loading the values of the accelerometer biases which are pre-specified at the factory or obtained from accelerometer specifications. Calibration 48 of accelerometers 1-6 is accomplished by running tracking system 15 while the object to be tracked 300 (e.g., head-mounted display (HMD) on a user) remains stationary. Position and orientation 130 are calculated according to the present invention as specified herein. Feedback filter loop 89 (discussed below, see also Digital and Kalman Filtering by S. M. Bozic, John Wiley and Sons, N.Y.) compares calculated position and/or orientation measurements 130 with the known position and/or orientation measurement (known to be stationary) and uses discrepancies between the two measurements to solve for bias and scaling factors 50 for each accelerometer 1-6. Tracking system 15 is operated such that main loop 41 is executed multiple times (approximately 15-20) for a successful calibration 48. Total calibration time is dependent on tracking processor 40 speed. In one embodiment, tracking system 15 alerts the user when calibration 48 is complete.

Notification is through, for example, a small LED on an HMD, visual notification on a display, or any other suitable means. For more accurate initial bias and scale factors 50, calibration 48 is repeated with object 300 in several different orientations. Initialization 48 also includes resetting correction factors 120 (Pe, ve, Ωe, we) to zero or their reference values." (Horton, 5:59-6:24.)

- Fuhrmann teaches a calibration for augmented reality systems. Fuhrmann at 222 ("The first step in the proposed calibration method is registration of the tracker system so that it corresponds to the selected world coordinate system, i.e. the transformation tw. The registration process consists of three steps (Fig. 3): First, the world coordinate system origin is determined by placing the stylus' hotspot to the desired location of the origin and pressing the stylus' button. Knowing the origin of the coordinate system, the up-vector can be defined by lifting the pen with pressed button along a vertical axis.").

- Marvit teaches a user input device that can be used to provide configuration data. Such configuration data includes the input mode of the device. Marvit at ¶ 76 ("[A] user may press a particular key or may move the device in a certain manner (e.g., a particular gesture) to switch input modes."). Such configuration data also includes motion sensitivity. Marvit at ¶ 66 ("Particular embodiments provide for any number of user-initiated actions to act as a single trigger for zero-point selection and selective engagement/disengagement of the motion sensitivity of the device. Such actions may include, for example, the pressing of a key on input 14, moving device 10 in a particular way (e.g., movement corresponding to a particular gesture), and tapping display 12."). Further, such configuration data includes noise

thresholds. Marvit at ¶ 159 ("Handheld devices in particular embodiments may also allow users to set and vary noise thresholds of the device. Noise thresholds are the magnitude of motion of the device that must be detected in order to be considered intended motion input (e.g., an intended gesture) of the user.").

- Sati discloses "[t]he next step 102 involves calibrating the positional sensors or trackers on the instruments 16, implants 20 and a user's 18 hand in order to determine their position in a 3- dimensional space and their position in relation to each other. This is accomplished by insertion of the verification block that gives absolute position and orientation." (Sati, ¶ 46.)

To the extent a prior art reference is argued or found not to disclose the limitations addressed in this section as recited in the Asserted Claims, and as an alternative to the teachings of that reference if it discloses the limitations, the claimed features would have been obvious to modify or combine with that reference for at least the following reasons in addition to the motivations to combine identified separately in these contentions:

- All elements of the claim are disclosed in the references with no change in their respective functions, and the combination would have yielded nothing more than predictable results.
- The advantages associated with this feature were well-known and would have been appreciated by persons of ordinary skill in the art, thereby motivating the usage of this feature to combine with or modify the teachings of other references. For example, using calibration of six degrees of freedom sensors was well known in the art before the alleged invention. Allowing a user to provide configuration data, in the context of video game systems was also well known in the art before the alleged

invention. In addition, the calibration of sensors and providing configuration data, which also would have obviously been used in hand-held communication systems in order to provide well-known benefits and advantages such as increased tracking accuracy and customization based on user.

- References disclosing these concepts teach the beneficial utility of them, including as cited in the claim charts submitted herewith. Defendants may rely upon the cited disclosures, among others, to show and illustrate the motivations to combine.

A person of ordinary skill in the art would have had a reasonable expectation of success in combining in the manner described above, as the technological underpinnings behind input device calibration, providing calibration data, and providing configuration data were well-known prior to 2004, as the Calibration/configuration references cited above confirm.

Specific evidence of the motivation to combine includes the references and passages therein cited in the claim charts submitted herewith for the applicable claim limitations, which reflect the reasons and motivations to combine and modify listed above and additional reasons and motivations to combine and modify that Defendants may rely upon. Defendants also expect to rely on expert testimony regarding motivation to combine.

(13) "Processing system on the communication device" References

Claims 45, 46, and 48 of the '659 Patent recite limitations of a communication device or controller including a processing system. For purposes of these Invalidity Contentions, prior art references that disclose a communication device or controller including a processing system are "Processing system on the communication device" references. While each reference that discloses any of the "Processing system on the communication device" limitations as indicated in the claim

charts submitted herewith is a "Processing system on the communication device" reference, for convenience, the following is a non-exhaustive list of prior art references that are "Processing system on the communication device" references:

- Howard '374
- Okamoto
- Eyestone
- Nishitani
- Rosenberg
- Cunningham
- Tremblay
- Immersion 3D Interaction Product Line
- Martin '812
- Horton
- Hinckley
- Hall
- Natoli
- Marvit
- Woolston
- Yamashita
- Endo

Nothing about these claim limitations adds anything non-obvious over the prior art. The features of communication devices or controllers including a processing system were well-known

in the art before the alleged invention of the Asserted Patents and are described in the disclosures of numerous references submitted and charted herewith. The claimed functionality is disclosed in the prior art cited herein, including the disclosures cited in the claim charts served herewith and within each of the foregoing identified references. Further, exemplary specific disclosures of the claimed functionality in the prior art, which disclose the applicable claim limitations and also reflect and illustrate the motivations to implement the claimed functionality and to modify and combine the teachings of the prior art to include the claimed functionality, are identified as follows:

- Rosenberg discloses a force feedback interface system featuring a local processor within the force feedback interface device. Rosenberg at 7:15-18 ("Interface device 14 includes a local microprocessor 26, sensors 28, actuators 30, a user object 34, optional sensor interface 36, an optional actuator interface 38, and other optional input devices 39."); Fig. 1.
- Rosenberg teaches that "[l]ocal memory 27, such as RAM and/or ROM, is preferably coupled to microprocessor 26 in interface device 14 to store instructions for microprocessor 26 and store temporary and other data." (Rosenberg, 10:27-30.)
- Horton teaches "[m]emory unit 37 is coupled to tracking processor 40 and is used for storing program instruction steps and storing data for execution by tracking processor 40. Memory unit 37 is a conventional computer memory unit such as a magnetic hard disk storage unit or random access memory (RAM) on a chip. Output from tracking processor 40 is position and orientation information 130." (Horton, 4:40-46.)
- Natoli teaches that a processor may be worn or mounted on the user. Natoli further teaches that the "processor may include a microprocessor such as a "PENTIUM"

microprocessor with memory, such as about 16 MB of RAM for executing the VR program. The first processor may be a desktop personal computer (PC), a workstation, or a portable or laptop computer. For example, the first processor may be worn or mounted on the user; for example, on a belt about the waist of the user as the user wears the VR headset." (Natoli, 5:53-60.)

- Marvit discloses a handheld user input device that contains "a display **12**, input **14**, processor **16**, memory **18**, communications interface **20** and motion detector **22**." (Marvit, ¶ 35).
- Hinckley teaches a mouse containing a microcontroller that processes rotation information. *E.g.* Hinckley at 7:18-27 ("[A] microcontroller 264 in mouse 260 receives electrical signals from a collection of switches and transducers that includes left button switch 266, right button switch 268, middle button switch 270 and wheel transducer 272. These signals are indicative of whether the respective button is being depressed or the amount by which the wheel is being rotated. Upon detecting a change in the state of a button or the wheel, microcontroller 264 generates a mouse packet that describes the current state of each of the mouse buttons and the distance the wheel has been rotated.").

To the extent a prior art reference is argued or found not to disclose the limitations addressed in this section as recited in the Asserted Claims, and as an alternative to the teachings of that reference if it discloses the limitations, the claimed features would have been obvious to modify or combine with that reference for at least the following reasons in addition to the motivations to combine identified separately in these contentions:

- All elements of the claim are disclosed in the references with no change in their respective functions, and the combination would have yielded nothing more than predictable results.
- The advantages associated with this feature were well-known and would have been appreciated by persons of ordinary skill in the art, thereby motivating the usage of this feature to combine with or modify the teachings of other references. For example, a processor system was well known in the art before the alleged invention. In addition, processors were a well-known and conventional prior art infrastructure for running a set of programs instruction, which also would have obviously been used in hand-held communication systems in order to provide well-known benefits and advantages such as increased processing, increased accuracy, and reduction of latency by outsourcing a portion of the processing onto the communication device itself.
- References disclosing these concepts teach the beneficial utility of them, including as cited in the claim charts submitted herewith. Defendants may rely upon the cited disclosures, among others, to show and illustrate the motivations to combine.

A person of ordinary skill in the art would have had a reasonable expectation of success in combining in the manner described above, as communications devices that included processing systems were well-known prior to 2004, as the Processing system on the communication device References cited above confirm.

Specific evidence of the motivation to combine includes the references and passages therein cited in the claim charts submitted herewith for the applicable claim limitations, which reflect the reasons and motivations to combine and modify listed above and additional reasons and

motivations to combine and modify that Defendants may rely upon. Defendants also expect to rely on expert testimony regarding motivation to combine.

(14) "Second communication device" References

Claims 27, 28, and 32 of the '151 Patent, claims 44 and 48 of the '483 Patent, claims 32, 50, 63, 64, 72, and 73 of the '354 Patent, claims 2, 3, 5, 6, 32, 50, 58, 63, 72, 73, and 95 of the '325 Patent, and claim 46 of the '659 Patent recite limitations of a system with a second communication device or controller. For purposes of these Invalidity Contentions, prior art references that disclose a system with a second communication device or controller are "Second communication device" references. While each reference that discloses any of the "Second communication device" limitations as indicated in the claim charts submitted herewith is a "Second communication device" reference, for convenience, the following is a non-exhaustive list of prior art references that are "Second communication device" references:

- Howard '374
- Eyestone
- Nishitani
- Rosenberg
- Tremblay
- Daniel
- Choy
- Horton
- Kaplan
- Colmenarez

- Hinckley
- Hall
- Natoli
- Woolston
- Yamashita
- Endo
- McRae
- Weston

Nothing about these claim limitations adds anything non-obvious over the prior art. The features of a system with a second communication device or controller were well-known in the art before the alleged invention of the Asserted Patents and are described in the disclosures of numerous references submitted and charted herewith. The claimed functionality is disclosed in the prior art cited herein, including the disclosures cited in the claim charts served herewith and within each of the foregoing identified references. Further, exemplary specific disclosures of the claimed functionality in the prior art, which disclose the applicable claim limitations and also reflect and illustrate the motivations to implement the claimed functionality and to modify and combine the teachings of the prior art to include the claimed functionality, are identified as follows:

- Cheng '277 teaches a video game system with multiple controllers. *E.g.*, Cheng '277 at 3:16-28 ("With reference to FIG. 7, a third preferred embodiment of the present invention is shown. In this embodiment, the transmitting means of each of the control units (3J.4J) includes a wireless radio signal transmitter (T) which is connected electrically to the respective control button unit and which transmits

wireless radio signals when the control buttons (32.J.42J) are operated. The controller further includes a wireless radio signal receiver (R) which receives the wireless radio signals from the wireless radio signal transmitter (T) and which is connected electrically to a connector (80J) that is adapted to be connected electrically to the processing unit of the video game console (82) via a receptacle (81J).").

- Latypov concerns a system for determining the position and orientation of users playing interactive computer games, wherein the system features several communication devices placed on multiple "segments" of the user. Latypov at 6:52-59 ("Means for determining angles between segments 2 are sensors 4 intended for tracking position of segments and their parts relative to one another and arranged at places of articulations 3 of segments 2 and at segments 2 proper. They are intended for accurate tracking of the user's movements, inclusive of measuring the rotation angles of some segments relative to their axis, for example, of one end of a shoulder segment relative to its other end."); Fig. 1; 4:4-12 ("The aforementioned objects according to the invention are to be attained also through that the user's spatial position and orientation tracking and displaying system comprises: a plurality of sensors of relative rotation angles arranged adjacently to main joints between the user's locomotor system segments or at the very said segments to produce at outputs of said sensors the signals of relative rotation angles of said segments…").
- Rosenberg discloses a force feedback interface system with multiple interface devices coupled to the host computer system, allowing multiple players to interact

within the host application program. Rosenberg at 7:15-27 ("Interface device 14 includes a local microprocessor 26, sensors 28, actuators 30, a user object 34, optional sensor interface 36, an optional actuator interface 38, and other optional input devices 39. Interface device 14 may also include additional electronic components for communicating via standard protocols on bus 24. In the preferred embodiment, multiple interface devices 14 can be coupled to a single host computer system 12 through bus 24 (or multiple buses 24) so that multiple users can simultaneously interface with the host application program (in a multi-player game or simulation, for example). In addition, multiple players can interact in the host application program with multiple interface devices 14 using networked host.").

- Daniel teaches the use of two input devices configured to fit within the palm of each of a user's hands and enabled to communicate with the computing device. (Daniels, ¶ 34, Fig. 2).
- Choy describes that "smaller limb segments, such as the fingers, need to be processed so that the system knows when the user makes specific hand gestures. For this to work, we require the use of data gloves for both hands. These gloves can read the positions of the various fingers and provide the PC with the required information, and it can be used effectively with the motion tracking system explained above." (Choy, 6:1-49.) Choy further suggests the use of "2 CyberTouch Gloves (suggested)" to use with the invention disclosed in Choy. (Choy, 8:33-34.)
- Natoli teaches "the disclosed VR keyboard system also includes at least one VR glove. In a preferred embodiment, two VR gloves are used to provide the user with full multi-hand functionality for VR keyboard inputs. However, one VR glove may

be used for specific applications, such as numerical data entry and/or telephone number entry using a VR numerical keypad." (Natoli, 5:61-67.)

To the extent a prior art reference is argued or found not to disclose the limitations addressed in this section as recited in the Asserted Claims, and as an alternative to the teachings of that reference if it discloses the limitations, the claimed features would have been obvious to modify or combine with that reference for at least the following reasons in addition to the motivations to combine identified separately in these contentions:

- All elements of the claim are disclosed in the references with no change in their respective functions, and the combination would have yielded nothing more than predictable results.
- The advantages associated with this feature were well-known and would have been appreciated by persons of ordinary skill in the art, thereby motivating the usage of this feature to combine with or modify the teachings of other references. For example, having a second communication device generally was widely known and used in the prior art, and the use of a second hand-held communication device, either used by one person or two people, which also would have obviously been used in video game systems and movement, position, and orientation tracking in order to provide well-known benefits and advantages such as increased participation, allowing the use of multiplayer, increased immersion, increased tracking accuracy, and the ability to track both hands.
- References disclosing these concepts teach the beneficial utility of them, including as cited in the claim charts submitted herewith. Defendants may rely upon the cited disclosures, among others, to show and illustrate the motivations to combine.

A person of ordinary skill in the art would have had a reasonable expectation of success in combining in the manner described above, as including or adapting a second communication device and the technological underpinnings behind them were well-known prior to 2004, as the Second communication device References cited above confirm.

Specific evidence of the motivation to combine includes the references and passages therein cited in the claim charts submitted herewith for the applicable claim limitations, which reflect the reasons and motivations to combine and modify listed above and additional reasons and motivations to combine and modify that Defendants may rely upon. Defendants also expect to rely on expert testimony regarding motivation to combine.

(15) "In electrical communication with the other communication device" References

Claim 27 of the '151 Patent, claims 44 and 48 of the '483 Patent, claims 63 and 72 of the '354 Patent, and claims 2, 63, 72, and 95 of the '325 Patent recite limitations of a second communication device in electrical communication with a first communication device. For purposes of these Invalidity Contentions, prior art references that disclose a system or process for a second communication device in electrical communication with a first communication device are "In electrical communication with the other communication device" references. While each reference that discloses any of the "In electrical communication with the other communication device" limitations as indicated in the claim charts submitted herewith is a "In electrical communication with the other communication device" reference, for convenience, the following is a non-exhaustive list of prior art references that are "In electrical communication with the other communication device" references:

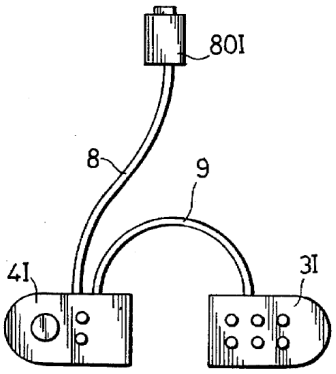
- Howard '374

- Rosenberg
- Tremblay
- Woolston
- Yamashita
- Endo
- Cheng
- Khoo
- McRae

Nothing about these claim limitations adds anything non-obvious over the prior art. The features of a second communication device in electrical communication with a first communication device were well-known in the art before the alleged invention of the Asserted Patents and are described in the disclosures of numerous references submitted and charted herewith. The claimed functionality is disclosed in the prior art cited herein, including the disclosures cited in the claim charts served herewith and within each of the foregoing identified references. Further, exemplary specific disclosures of the claimed functionality in the prior art, which disclose the applicable claim limitations and also reflect and illustrate the motivations to implement the claimed functionality and to modify and combine the teachings of the prior art to include the claimed functionality, are identified as follows:

- Cheng '277 teaches a controller that is in electrical communication with the other controller. *E.g.*, Cheng '277: 2:39-41 ("The controller of the present embodiment further includes a connector 80 which is adapted to be connected electrically to a processing unit (not shown) of the video game console."); 3:5-15 ("Referring now

to FIG. 6, a second preferred embodiment of the present invention is shown. In this embodiment, the transmitting means of the first control unit (3D) includes a first cable 9 having one end portion connected electrically to the control button unit thereof and an opposite end portion connected electrically to the control button unit of the second control unit (4I). The transmitting means of the second control unit (4) includes a second cable 8 having one end portion connected electrically to the control button unit thereof and an opposite end portion connected electrically to the connector (80I)."); Fig. 5; Fig. 6. Cheng discloses two video game controllers with the following structure:



(Cheng, Fig. 4.)

- Rosenberg discloses a force feedback interface system with multiple interface devices coupled to the host computer system, allowing multiple players to interact with each other within the host application program. Rosenberg at 7:15-27 ("Interface device 14 includes a local microprocessor 26, sensors 28, actuators 30, a user object 34, optional sensor interface 36, an optional actuator interface 38, and other optional input devices 39. Interface device 14 may also include additional electronic components for communicating via standard protocols on bus 24. In the preferred embodiment, multiple interface devices 14 can be coupled to a single host

computer system 12 through bus 24 (or multiple buses 24) so that multiple users can simultaneously interface with the host application program (in a multi-player game or simulation, for example). In addition, multiple players can interact in the host application program with multiple interface devices 14 using networked host.").

- Tremblay discloses tactile feedback devices that may be worn by several interacting users. Tremblay at 6:14-41 ("In yet another application of the vibrotactile device, a group of users may receive tactile sensations. In one example, users may wear individual vibrotactile units, or they may also share vibrotactile units as follows. A tactile sensation may be shared by one or more users making physical contact with the sensing body part of another user. For example, one user may wear vibrotactile units on the backs of his fingers. A second user, not wearing any vibrotactile units, may obtain vibrotactile feedback transmitted via the first user when the first user places the palmar side of his fingers on a sensing body part of the second user. The activating signal for each vibrotactile unit may be computer controlled via either user's actions or through a computer simulated event. In a second example, a group of users may each receive identical tactile feedback through individually mounted vibrotactile units. The common activating signal may correspond to measured body parts from a single, optionally separate, user. Different users may also be responsible for producing the common activating signal for one or more vibrotactile units. For instance, the movement of one user's arm may control the vibrotactile unit on each user's arm; and the voice of a second user may control the Vibrotactile unit on each user's back; the eye-gaze of three other users may control the

vibrotactile unit upon which they stare in unison. An example application of a single user controlling many user's vibrotactile sensations is a new form of entertainment where a performer creates vibrotactile sensations for an audience.").

- Howard teaches, "The system is configured appropriately for the specific application, and the most flexible implementation uses the master/slave configuration depicted in FIG. 9. This allows the slave wrist device 65 to utilize a low power transmitter, such as a standard simplex transmitter at a low data rate for communication to the master wrist device." (Howard, 3:61-66.)

To the extent a prior art reference is argued or found not to disclose the limitations addressed in this section as recited in the Asserted Claims, and as an alternative to the teachings of that reference if it discloses the limitations, the claimed features would have been obvious to modify or combine with that reference for at least the following reasons in addition to the motivations to combine identified separately in these contentions:

- All elements of the claim are disclosed in the references with no change in their respective functions, and the combination would have yielded nothing more than predictable results.
- The advantages associated with this feature were well-known and would have been appreciated by persons of ordinary skill in the art, thereby motivating the usage of this feature to combine with or modify the teachings of other references. As discussed above, having a second communication device generally was widely known and used in the prior art. A skilled artisan would recognize the benefits of connecting a second communication such that it was in electrical communication with a first communication device. A skilled artisan would also recognize data

communication and data processing benefits from connecting a first and second communication device in such a manner. A skilled artisan would also recognize that the connection of the two communication devices provides well-known benefits and advantages such as increased tracking accuracy and decreased latency.

- References disclosing these concepts teach the beneficial utility of them, including as cited in the claim charts submitted herewith. Defendants may rely upon the cited disclosures, among others, to show and illustrate the motivations to combine.

A person of ordinary skill in the art would have had a reasonable expectation of success in combining in the manner described above, as two or more communications devices, in electrical communication with each other, and the technological underpinnings behind them were well-known prior to 2004, as the In electrical communication with the other communication device References cited above confirm.

Specific evidence of the motivation to combine includes the references and passages therein cited in the claim charts submitted herewith for the applicable claim limitations, which reflect the reasons and motivations to combine and modify listed above and additional reasons and motivations to combine and modify that Defendants may rely upon. Defendants also expect to rely on expert testimony regarding motivation to combine.

(16) "Displacement/reference vector" References

Claims 28, 29, 30, and 32 of the '151 Patent recite limitations of a system that calculates a displacement vector, compares it to a reference vector, and calculates a numerical result for processing movement information for communication devices or controllers. For purposes of these Invalidity Contentions, prior art references that disclose a system that calculates a displacement vector, compares it to a reference vector, and calculates a numerical result for

processing movement information for communication devices or controllers are "Displacement/reference vector" references. While each reference that discloses any of the "Displacement/reference vector" limitations as indicated in the claim charts submitted herewith is a "Displacement/reference vector" reference, for convenience, the following is a non-exhaustive list of prior art references that are "Displacement/reference vector" references:

- Eyestone
- Martin '812
- Gombert
- Goodwin
- Rolland
- Horton
- French
- Ohshima
- Hall
- Marvit
- Woolston
- Yamashita
- Endo
- Weston

Nothing about these claim limitations adds anything non-obvious over the prior art. The features of system that calculates a displacement vector, compares it to a reference vector, and calculates a numerical result for processing movement information for communication devices or

controllers were well-known in the art before the alleged invention of the Asserted Patents and are described in the disclosures of numerous references submitted and charted herewith. The claimed functionality is disclosed in the prior art cited herein, including the disclosures cited in the claim charts served herewith and within each of the foregoing identified references. Further, exemplary specific disclosures of the claimed functionality in the prior art, which disclose the applicable claim limitations and also reflect and illustrate the motivations to implement the claimed functionality and to modify and combine the teachings of the prior art to include the claimed functionality, are identified as follows:

- Howard '632 describes a system that calculates a displacement vector for the sensed motion and compares it to reference vectors to recognize certain user actions. *E.g.*, Howard '632 at 6:41-67 ("Accordingly, the present invention can also be adapted to operate in a mouse-like fashion by generating pointing Strokes. Pointing Stroke operation converts the motion vectors generated by deflection from any random rest position of the hand to any desired ending position of the hand into a Stroke of cursor motion on the computer Screen. For example, assume that the user's hand is in the position shown in FIG. 2, which may or may not correspond to the home position described above, at a time t. Further Suppose that the user then deflects his hand in the direction of arrow a into a different position at time t. Device 10 resolves the respective magnitudes of reflected beam 48 at times t and t into hand positions at times t and t as described above, and then into a motion vector for the hand from time t to time t. The motion vector is then resolved into a corresponding Stroke of motion that decays to Zero at the ending position rather than continuing until the hand is returned to the home position, and causes a cursor motion on the

computer Screen that mimics the hand motion from time t to time t, as though a finger or Stylus in the hand were directing the motion of the cursor on the Screen. That is, the cursor will move in the direction corresponding to the direction of hand deflection by an amount corresponding to the amount of hand deflection and will then stop. Once calibrated to an individual user, pointing Stroke operation offers an even more direct and comfortable Sense of control over cursor motion."); 7:35-58 ("These resolutions of finger position and orientation over time are then compiled and correlated with a preprogrammed library of gesture images such as those stored in a content-addressable memory functioning as a lookup table, and device 10 is able to recognize the gesture made-in the above example, a finger-wagging gesture. The preprogrammed library of gestures may include Standardized gestures (e.g. American Sign Language gestures) as well as user-specific gestures captured and recorded during a machine-training phase (e.g. the finger-wagging described above). Gestures captured and recorded during a machine training phase will inherently be programmed to the user's specific hand size, shape, and motion Sets. Gesture recognition capabilities can be made even more powerful by coupling the resolution of hand positions and orientations as described above with the resolution of hand motion. Hand motion can be resolved by using the optical pointing embodiment described above, or, where tracking of whole-hand motion is desired, by including gyroscopes, accelerometers, or other motion Sensors 40 or environmental Sensors 42 in device 10. By combining time-domain analysis of hand positions and orientations with time-domain analysis of

hand motion, numerous image recognition processes are available for application in decoding gestures.").

- LaChapelle '322 teaches calculating displacement values/vectors for a user's movement and comparing it to reference. *E.g.*, LaChapelle '322 at 10:17-20 ("Alternatively to obtaining displacement values from a live performer, displacement values may be supplied by a program or by some other means such as interactively 20 moving a set of markers on a computer screen."); 10:47-54 ("Following the motion of the actor 300, step 302 involves computing the displacement of the physical markers in the synthetic coordinate space. At each frame, a displacement vector [e] is computed from a reference. The preferred embodiment uses the neutral expression E0 as the reference. A mapping template is used to translate the physical displacement of the markers into displacements in the synthetic coordinate space.").
- Ohshima teaches the determination of a displacement vector and comparison to reference vectors. *E.g.*, Ohshima at 6:26-39 ("In step S6, change velocity V (time derivative of L') of the hand location Li, and acceleration A, (time derivative of Velocity V) are computed. Note that the currently measured location and posture (L. P.) of the hand relative to the head are stored in a predetermined memory for the next Velocity and acceleration computations in step S6. In this case, data for two previous measurements suffice. In this specification, a combination of information of the location, posture, time, and the like for the head, and those for the hand input from the location/posture measurement sections 2001 is called 'primary information', and the location and posture, and Velocity and acceleration

of the hand with reference to the head are called 'secondary information'."); 7:47-60 ("Then, if YES in steps S102 and S104, i.e., Z_{hand}-C_{01} and α_1<C_{02} in other words, if the player has moved the hand backward to a location behind the center of the head (C=0.0) in the back direction of the head while the deviation of the angle the direction of the hand makes with the back direction of the head is kept suppressed to be equal to or smaller than 45° (FIG. 16), it is determined that the player wants to make a loading action. Then, the current time t is saved in a register to in step S106, the current hand location L is saved in a register Lo in step S108, and an action state value-1 (loading state) is output in step S110.").

- Latypov concerns a system for determining the position and orientation of users playing interactive computer games, wherein the system determines motion and position based on a reference vector. Latypov at 12:37-40 ("For this purpose, determined are angles between a vector of a segment, whereat means for determining reference directions are disposed, and the reference directions."); 3:32-50 ("These objects are to be attained through that a method to track and display the spatial position and orientation according to this invention comprises the following steps: a) attaching means, for determining at least one angle between segments adjacent to a respective articulation, at each main articulation of the user's locomotor system; b) arranging, at least at one of segments of the user's locomotor system, means for determining reference directions; c) determining orientation of at least one segment, whereat means for determining reference directions is arranged, relative to said reference directions; d) determining angles between segments adjacent to said main articulations; e) determining user's spatial

orientation and position as a whole on the basis of obtained angles values and the orientation of said at least one segment, whereat means for determining reference directions are arranged.").

- Junichi discloses a game control unit with a position-detecting system where position is predicted based on a reference position. Junichi at ¶ 46 ("Subsequently, in step S 12, the game control unit 32 stores the coordinates with respect to the angle of view of the extracted identifier, and corrects the direction / angle with respect to the display unit 12 of the controller-type imaging apparatus 11 and the aiming point 16 At the time of the calibration operation, the position is predicted from the reference relative position of the identifier, and the position of the invisible identifier is predicted.").
- Sati teaches, "The next step 118 involves performing the desired action in accordance with the pre-set path. However, the user 18 may deviate from the pre-set path or workflow steps in which case the system 10 alerts the user 18 of such an action. The system 10 provides visual, auditory or other sensory feedback to indicate when that the surgeon 18 is off the planned path." (Sati, ¶ 52.)
- Marvit states, "The device includes a control module operable to track movement of the handheld device using the motion detection module, compare the tracked movement against potential ones of the gestures, determine that the tracked movement does not indicate a unique one of the gestures, and generate feedback reporting that the tracked movement does not indicate a unique one of the gestures using the user interface." (Marvit, Abstract.)

- Goodwin teaches, "the apparatus further includes a cursor tracking module that, when operating, determines a position of the three-dimensional cursor in the three dimensional modeling environment, the position of the cursor corresponding to a position of the input device, an object tracking module that, when operating, tracks a local origin point on the selected virtual object, and a transformation module that, when operating, defines a mathematical transformation in the three-dimensional modeling environment, the mathematical transformation representative of a difference in location of the local origin point and the three-dimensional cursor position at a time the user selects the virtual object. In some embodiments, the transformation module defines the mathematical transformation in terms of at least one of a three-dimensional translational vector, a rotation about the local origin point, and a rotation about the three-dimensional cursor position." (Goodwin, 4:44-60.) Goodwin further teaches that "the transformation can include vectorial components corresponding to each of the dimensions of the modeling space, and can also include angular displacements, or rotations, centered at either or both of the position in the three dimensional modeling space of the input device, such as interface 10, or the position of the local origin point 445." (Goodwin, 12:19-36.)
- Gombert discloses "[a] manually actuated input device for commanding machine- and/or computer-assisted control operations for kinematic motions of a real or virtual multipart object, including a force/moment sensor with which linear displacements in the form of translational movements in the direction of three axes (X, Y, Z), each standing perpendicular on the other, of a three-dimensional rectangular system of coordinates and/or rotational excursions in the form of

rotational motions (A, B, C) about these three axes are sensed and converted into commanded motions of the object to be controlled is characterized by the commanded individual linear displacements and/or rotational excursions of the force/moment sensor being assigned specific kinematic motion patterns of parts of the real or virtual object thereby permitting manipulation or animation thereof as a transforming interlink and by the commanded velocities of the corresponding individual linear displacements and/or rotational excursions of the force/moment sensor being additionally weightable as a kinematic interlink assignment. The invention can be put to use e.g. in kinematic animation operations of human-like robots, figures or virtual animate beings." (Gombert, Abstract.)

- Marvit describes a user input device that can recognize user gestures by comparing user motions against a gestural database. *E.g.*, Marvit at ¶ 122 ("Handheld device 10 receives raw motion data of a particular motion of the device through motion detection components, such as accelerometers, cameras, rangefinders and/or gyros. The raw motion data is processed at the handheld device. Particular databases, such as gesture and gesture mapping databases, may be accessed to determine a matching gesture and intended function based on motion tracked by a control module of the device.").

- Sati teaches "After the planning stages, the procedure is started at step 116 by detecting a desired action from the user's hand gestures stored on said computer-readable medium; or from the positional information of a tracked instrument with respect to the fracking system 27 or other tracked device, or a combination of these two triggers; The next step 118 involves performing the desired action in

accordance with the pre-set path. However, the user 18 may deviate from the pre-set path or workflow steps in which case the system 10 alerts the user 18 of such an action. The system 10 provides visual, auditory or other sensory feedback to indicate when that the surgeon 18 is off the planned path. The 2D images 24 are updated, along with virtual representation of the implant 20 and instrument 16 positioning, and relevant measurements to suit the new user 18 defined path. After each step in the work flow, the user 18 increments the task list by gesturing or by selection of a different instrument. During the procedure, the references previously recorded provide feedback to the user 18 to correctly position and orientate the instruments and implants." (Sati, ¶ 52-53.)

To the extent a prior art reference is argued or found not to disclose the limitations addressed in this section as recited in the Asserted Claims, and as an alternative to the teachings of that reference if it discloses the limitations, the claimed features would have been obvious to modify or combine with that reference for at least the following reasons in addition to the motivations to combine identified separately in these contentions:

- All elements of the claim are disclosed in the references with no change in their respective functions, and the combination would have yielded nothing more than predictable results.
- The advantages associated with this feature were well-known and would have been appreciated by persons of ordinary skill in the art, thereby motivating the usage of this feature to combine with or modify the teachings of other references. For example, the calculation of a displacement vector to a reference vector was a well-known and conventional prior art teaching for calculating changes in movement,

position, and/or orientation. Moreover, the calculation of a numerical result between a displacement vector and reference vector is inherent in calculations of change in six degrees of freedom. In addition, as discussed above, a pair of communication devices, utilizing six degrees of freedom sensors, were a well-known and conventional prior art infrastructure for providing tracking of changes in movement, and orientation, which also would have obviously been used with the calculation of a displacement and reference vector to provide well-known benefits and advantages such as increased tracking accuracy, prediction, and measurements from multiple devices.

- References disclosing these concepts teach the beneficial utility of them, including as cited in the claim charts submitted herewith. Defendants may rely upon the cited disclosures, among others, to show and illustrate the motivations to combine.

A person of ordinary skill in the art would have had a reasonable expectation of success in combining in the manner described above, as the idea of a displacement and reference vector, the calculations of such vectors, and the technological underpinnings behind them were well-known prior to 2004, as the Displacement/reference vector References cited above confirm.

Specific evidence of the motivation to combine includes the references and passages therein cited in the claim charts submitted herewith for the applicable claim limitations, which reflect the reasons and motivations to combine and modify listed above and additional reasons and motivations to combine and modify that Defendants may rely upon. Defendants also expect to rely on expert testimony regarding motivation to combine.

(17) "Remote processing system receiving and transmitting data" References

Claims 1, 27, 28, and 32 of the '151 Patent, claims 44 and 48 of the '483 Patent, claims 32, 49, 50, 63, and 72 of the '354 Patent, claims 1, 32, 49, 50, 63, 72, 85, 89, and 94 of the '325 Patent, and claims 45 and 46 of the '659 Patent recite limitations of a system that includes a remote processing system that receives and transmit data to/from a communication device. For purposes of these Invalidity Contentions, prior art references that disclose a system that includes a remote processing system that receives and transmit data to/from a communication device are "Remote processing system receiving and transmitting data" references. While each reference that discloses any of the "Remote processing system receiving and transmitting data" limitations as indicated in the claim charts submitted herewith is a "Remote processing system receiving and transmitting data" reference, for convenience, the following is a non-exhaustive list of prior art references that are "Remote processing system receiving and transmitting data" references:

- Howard '374
- Okamoto
- Eyestone
- Nishitani
- Rosenberg
- Cunningham
- Tremblay
- Immersion 3D Interaction Product Line
- Martin '812
- Daniel

- Choy
- Gombert
- Goodwin
- Horton
- Kaplan
- Colmenarez
- French
- Harada
- Hinckley
- Salisbury
- Hall
- Natoli
- Woolston
- Yamashita
- Endo
- InterSense IS-900
- DataGlove
- Weston

Nothing about these claim limitations adds anything non-obvious over the prior art. The features of a system that includes a remote processing system that receives and transmit data to/from a communication device were well-known in the art before the alleged invention of the Asserted Patents and are described in the disclosures of numerous references submitted and charted

herewith. The claimed functionality is disclosed in the prior art cited herein, including the disclosures cited in the claim charts served herewith and within each of the foregoing identified references. Further, exemplary specific disclosures of the claimed functionality in the prior art, which disclose the applicable claim limitations and also reflect and illustrate the motivations to implement the claimed functionality and to modify and combine the teachings of the prior art to include the claimed functionality, are identified as follows:

- Cheng '277 teaches a remote processing video game system. *E.g.*, Cheng '277 at 3:16-28 ("With reference to FIG. 7, a third preferred embodiment of the present invention is shown. In this embodiment, the transmitting means of each of the control units (3J.4J) includes a wireless radio signal transmitter (T) which is connected electrically to the respective control button unit and which transmits wireless radio signals when the control buttons (32.J.42J) are operated. The controller further includes a wireless radio signal receiver (R) which receives the wireless radio signals from the wireless radio signal transmitter (T) and which is connected electrically to a connector (80J) that is adapted to be connected electrically to the processing unit of the video game console (82) via a receptacle (81J).").
- Ohshima teaches a remote processing system. *E.g.*, Ohshima at 5:4-13 ("FIG. 2 shows the game apparatus system of this embodiment. Referring to FIG. 2, the game system of this embodiment has a command generation unit 2000 for receiving signals from the two sensors and converting them into a command, and a game apparatus 3000. The command generation unit 2000 analyzes an action of the user 1000 on the basis of the output signals from the sensors 100 and 200, and generates

a command in accordance with the analysis result. The generated command is sent to the game apparatus 3000, which executes the command, i.e., the game progresses.").

- Rosenberg discloses a force feedback interface featuring a host computer as a remote processing system. Rosenberg at 15:39-42 ("In a different, host-controlled embodiment that utilizes microprocessor 26, host computer 12 can provide low-level force commands over bus 24, which microprocessor 26 directly transmits to the actuators."); 7:29-48 ("Local microprocessor 26 is coupled to bus 24 and is preferably included within the housing of interface device 14 to allow quick communication with other components of the interface device. Processor 26 is considered local to interface device 14, where 'local' herein refers to processor 26 being a separate microprocessor from any processors in host computer system 12. 'Local' also preferably refers to processor 26 being dedicated to force feedback and sensor I/O of interface device 14, and being closely coupled to sensors 28 and actuators 30, such as within the housing for interface device or in a housing coupled closely to interface device 14. Microprocessor 26 can be provided with software instructions to wait for commands or requests from computer host 16, decode the command or request, and handle/control input and output signals according to the command or request. In addition, processor 26 preferably operates independently of host computer 16 by reading sensor signals and calculating appropriate forces from those sensor signals, time signals, and stored or relayed instructions selected in accordance with a host command.").

- Nichols teaches, "Performance data sensed by the encoder and haptic feedback instructions for driving the servo will be bussed through parallel data streams to and from a Servo To Go data acquisition and servo control ISA card, installed in a Pentium III, 600 MHz PC, running Windows 98." (Nichols, p.2.)
- Mishra states, "In one embodiment, bi-directional communications can occur over the wireless link 103 between the input devices 102A, 102B and the sub-system 101. … The sub-system 101 may alternatively be a computer that has wireless connections to a pointer device (e.g., mouse) and one or more other input devices (e.g., joystick, keyboard, etc.)." (Mishra, 3:4-22.)
- Hinckley discloses, "In most embodiments, the input device is connected to host computer 262 through a connection port in the device such as connection port 238 of FIG. 5. … In [some] embodiments, the connection is an infrared or RF (radio frequency) communication link between the device and the host computer." (Hinckley, 7:8-15.)
- Goodwin discloses "a commercially available personal computer that includes a CPU, one or more memories, one or more storage media, one or more output devices, such as a display 210, and one or more input devices, such as a keyboard 220. The computer operates using any commercially available operating system, such as any version of the Windows™ operating systems from Microsoft Corporation of Redmond, Wash., or the Linux™ operating system from Red Hat Software of Research Triangle Park, N.C. In some embodiments, a haptic device such as the interface 10 is present and is connected for communication with the

computer 200, for example with wires. In other embodiments, the interconnection can be a wireless or an infrared interconnection." (Goodwin, 8:4-48.)

- Daniel teaches of a game system as a remote processing system. Daniel discloses "the external input device configured to be held by a user to provide input to a receiver in accordance with one embodiment of the invention. External input device 100 is configured to be held within the palm of a user's hand 102. As the user squeezes and relaxes the pressure applied on the protrusions of input device 100, through pressure applied by the user's fingers and thumb, electronics embedded in the input device sense the change in position of the protrusions and generate commands transmitted to receiver 106. Receiver 106 is in communication with device 108 which is controlled by the signals transmitted to the receiver from input device 100. In one embodiment device 108 can be a computer, or a game console which can be manufactured by any company. For purposes of example, the game console may be a PLAYSTATION™ game console. It will be apparent to one skilled in the art that the embedded electronics may generate short range radio signals. These signals can be processed in accordance with public or proprietary processing circuitry and/or software. For exemplary purposes, communication of the radio signals can be done using standards such as BLUETOOTH, or other suitable wireless technology (e.g., such as IEEE 802.11). While it is preferred to employ a technology not requiring a line of sight, the embodiments described herein can also be applied to technologies requiring a line of sight such as infrared signals." (Daniel, ¶ 33.)

To the extent a prior art reference is argued or found not to disclose the limitations addressed in this section as recited in the Asserted Claims, and as an alternative to the teachings of that reference if it discloses the limitations, the claimed features would have been obvious to modify or combine with that reference for at least the following reasons in addition to the motivations to combine identified separately in these contentions:

- All elements of the claim are disclosed in the references with no change in their respective functions, and the combination would have yielded nothing more than predictable results.
- The advantages associated with this feature were well-known and would have been appreciated by persons of ordinary skill in the art, thereby motivating the usage of this feature to combine with or modify the teachings of other references. For example, various remote processing systems for receiving and transmitting data were well known in the art before the alleged invention. In addition, processing systems for receiving and transmitting movement, position and orientation data from an input device such as a haptic feedback controller, were a well-known and conventional prior art infrastructure, which also would have obviously been used with movement, position, and orientation tracking in order to provide well-known benefits and advantages such as providing processing of the sensor data, outputting feedback data, and outputting graphical data to a display.
- References disclosing these concepts teach the beneficial utility of them, including as cited in the claim charts submitted herewith. Defendants may rely upon the cited disclosures, among others, to show and illustrate the motivations to combine.

A person of ordinary skill in the art would have had a reasonable expectation of success in combining in the manner described above, as remote processing systems and the technological underpinnings behind them were well-known prior to 2004, as the Remote processing system receiving and transmitting data References cited above confirm.

Specific evidence of the motivation to combine includes the references and passages therein cited in the claim charts submitted herewith for the applicable claim limitations, which reflect the reasons and motivations to combine and modify listed above and additional reasons and motivations to combine and modify that Defendants may rely upon. Defendants also expect to rely on expert testimony regarding motivation to combine.

(18) "Feedback data" References

Claims 1, 30, and 32 of the '151 Patent, claims 44 and 48 of the '483 Patent, claims 32, 50, 63, and 72 of the '354 Patent, claims 1, 3, 5, 6, 7, 10, 32, 49, 50, 63, 72, 85, 89, 96, and 98 of the '325 Patent recite limitations of a communication device or controller that receive feedback data from a remote processing system. For purposes of these Invalidity Contentions, prior art references that disclose a communication device or controller that receive feedback data from a remote processing system are "Feedback data" references. While each reference that discloses any of the "Feedback data" limitations as indicated in the claim charts submitted herewith is a "Feedback data" reference, for convenience, the following is a non-exhaustive list of prior art references that are "Feedback data" references:

- Howard '374
- Okamoto
- Eyestone
- Nishitani

- Rosenberg
- Cunningham
- Tremblay
- Immersion 3D Interaction Product Line
- Martin '812
- Daniel
- Choy
- Goodwin
- Deering
- Horton
- French
- Nichols
- Salisbury
- Hall
- Natoli
- Marvit
- Woolston
- Yamashita
- Endo
- Weston

Nothing about these claim limitations adds anything non-obvious over the prior art. The features of a communication device or controller that receive feedback data from a remote

processing system were well-known in the art before the alleged invention of the Asserted Patents and are described in the disclosures of numerous references submitted and charted herewith. The claimed functionality is disclosed in the prior art cited herein, including the disclosures cited in the claim charts served herewith and within each of the foregoing identified references. Further, exemplary specific disclosures of the claimed functionality in the prior art, which disclose the applicable claim limitations and also reflect and illustrate the motivations to implement the claimed functionality and to modify and combine the teachings of the prior art to include the claimed functionality, are identified as follows:

- Ohshima teaches that "a device that physically stimulates the player such as a vibrator may be built in a band for fixing the HMD or the interactive input device, and may feedback an action to the player in accordance with the game situation. For example, when a given player defends against an enemy's attack or defeats an enemy in the vicinity of the player, vibration as shock may be given to the player, thus providing a real presentation effect." (Ohshima, 12:36-45.)
- Daniel discloses "[t]he input detection program includes program instructions for determining when to trigger input commands of a main program and tactile feedback responses to an external input device configured to be held by a user. The input detection program includes program instructions for detecting a signal from the external input device. The signal is generated by causing a physical change to the external input device. Program instructions for triggering an input command at the program run on the computing device are provided. The triggering results from the detected signal from the external input object. In one embodiment program

instructions for generating a tactile feedback signal at the external input device in response to the detected signal are provided." (Daniel ¶ 11.)

- Natoli teaches a "method using a force feedback VR glove, in which the position signals from the VR glove are provided to the first processor, which in turn generates and sends actuation signals to a plurality of actuators, for example, in the tips of the fingers of the VR glove. FIG. 19 illustrates a flowchart of a method implementing the third embodiment of FIG. 18, in which the VR keyboard system gets the VR glove position, and detects for motions of the fingers corresponding to the engaging and depressing of the VR keys. Subsequent to or concurrent with the generation of key codes and the other steps of FIG. 4 to perform the VR keyboard method, the disclosed VR keyboard system and method generates actuation signals corresponding to the keys depression motions, and applies the actuation signals to the actuators in the VR glove to provide force feedback to the user. Accordingly, the user is provided with the physical sensation of depressing an actual keyboard key, when instead the user has depressed in VR a VR key of the VR keyboard." (Natoli, 11:1-20.)
- Goodwin states, "Those familiar with the haptic arts will recognize that there are many different haptic interfaces that convert the motion of an object under the control of a user to electrical signals, many different haptic interfaces that convert force signals generated in a computer to mechanical forces that can be experienced by a user, and haptic interfaces that accomplish both results." (Goodwin, 7:64-8:3.)
- Marvit describes a user input device that provides feedback based on whether or not it recognizes a user's physical gestures. Marvit at ¶ 102 ("In order to indicate

that a particular movement of the device by a user is recognized as a particular gesture, handheld devices in some embodiments provide feedback to notify the user that the movement was in fact recognized as a gesture."). Marvit further discloses that this feedback can be in the form of auditory, haptic, or visual indicators. *E.g.*, Marvit at ¶ 103 ("This feedback may comprise an audio format, such as speech, a beep, a tone or music, a visual format, such as an indication on the device display, a vibratory format or any other suitable feedback format. Audio feedback may be provided through a user interface speaker or headphone jack of device 10, and vibratory feedback may be provided through a user interface vibration generation module of device 10. Audio, visual and vibratory feedback may be varied to provide capability for multiple feedback indicators.").

- Klitsner discloses an input device that provides auditory feedback. *E.g.* Klitsner at Abstract ("The controller outputs a first command signal to the audible output device that relates to a first selected input device. The controller then outputs a second command signal to the audible output device relating to a second selected input device when the first selected input device is actuated within a predetermined period of time. When the first selected input device is not actuated within the predetermined period of time, or when an input device other than the selected input device is actuated in response to the first command signal, the controller outputs an error command signal to the audible output device.")

To the extent a prior art reference is argued or found not to disclose the limitations addressed in this section as recited in the Asserted Claims, and as an alternative to the teachings of that reference if it discloses the limitations, the claimed features would have been obvious to

modify or combine with that reference for at least the following reasons in addition to the motivations to combine identified separately in these contentions:

- All elements of the claim are disclosed in the references with no change in their respective functions, and the combination would have yielded nothing more than predictable results.
- The advantages associated with this feature were well-known and would have been appreciated by persons of ordinary skill in the art, thereby motivating the usage of this feature to combine with or modify the teachings of other references. For example, as discussed above, handheld output devices for providing sensor stimuli were well known in the art before the alleged invention, including out output devices for video game systems, which included means for communications. In addition, as discussed above, output devices for providing sensory stimuli, such as sound or haptic feedback, were a well-known and conventional prior art infrastructure for providing sensory stimuli in response to feedback data, which also would have obviously been used with movement, position, and orientation tracking and video game systems in order to provide well-known benefits and advantages such as increased immersion, entertainment, user experience, and feedback to the user. Feedback data, to trigger such output device stimuli was also well known in the art before the alleged invention, and provide well-known benefits and advantages, triggering of stimuli in response to commands issued from a remote computer.

- References disclosing these concepts teach the beneficial utility of them, including as cited in the claim charts submitted herewith. Defendants may rely upon the cited disclosures, among others, to show and illustrate the motivations to combine.

A person of ordinary skill in the art would have had a reasonable expectation of success in combining in the manner described above, as feedback data, and the technological underpinnings behind them were well-known prior to 2004, as the Feedback data References cited above confirm.

Specific evidence of the motivation to combine includes the references and passages therein cited in the claim charts submitted herewith for the applicable claim limitations, which reflect the reasons and motivations to combine and modify listed above and additional reasons and motivations to combine and modify that Defendants may rely upon. Defendants also expect to rely on expert testimony regarding motivation to combine.

(19) "Proportional feedback" References

Claim 20 of the '325 Patent and claims 45 and 46 of the '659 Patent recite limitations of a communication device that receive feedback data from a remote processing system proportional to movement information of the communication device. For purposes of these Invalidity Contentions, prior art references that disclose a communication device that receive feedback data from a remote processing system proportional to movement information of the communication device are "Proportional feedback" references. While each reference that discloses any of the "Proportional feedback" limitations as indicated in the claim charts submitted herewith is a "Proportional feedback" reference, for convenience, the following is a non-exhaustive list of prior art references that are "Proportional feedback" references:

- Howard '374
- Okamoto

- Eyestone
- Nishitani
- Rosenberg
- Cunningham
- Tremblay
- Immersion 3D Interaction Product Line
- Martin '812
- Nichols
- Salisbury
- Natoli
- Marvit
- Woolston
- Yamashita

Nothing about these claim limitations adds anything non-obvious over the prior art. The features of a communication device that receive feedback data from a remote processing system proportional to movement information of the communication device were well-known in the art before the alleged invention of the Asserted Patents and are described in the disclosures of numerous references submitted and charted herewith. The claimed functionality is disclosed in the prior art cited herein, including the disclosures cited in the claim charts served herewith and within each of the foregoing identified references. Further, exemplary specific disclosures of the claimed functionality in the prior art, which disclose the applicable claim limitations and also

reflect and illustrate the motivations to implement the claimed functionality and to modify and combine the teachings of the prior art to include the claimed functionality, are identified as follows:

- Rosenberg discloses, "The force is then set equal to the damping constant multiplied by the change in position. Commands that controlled an actuator based on this algorithm would produce a force proportional to the user object's motion to simulate movement through a fluid." (Rosenberg, 16:67-17:7).
- Barney, which discloses a system that identifies when a user makes movements with an input device constituting recognized "spells," teaches, "[I]n order to help users cast complex spells and help them identify when they have made a mistake or if they are about to cast the wrong or an unintended spell … various themed feedback effects such as glowing lights, halo effects or escalating Sound effects can be provided as each step in a complex spell is successfully completed." (Barney, 23:19-27).
- Shih teaches "[t]he resulting force sent to the haptic interface device 10 is proportional to the distance between the tool 28 and the haptic interface device location. In some embodiments, the force is also proportional to the difference in velocity or acceleration between the virtual tool 28 position and the haptic interface device location 98. The tool position on the virtual surface 25 is referred to herein as the surface contact point or SCP 226." (Shih, 21:34-43.)
- Marvit discloses a user input device with a display that provides visual feedback to user motions, including moving the display proportional to user motions. *E.g.*, Marvit at ¶ 85 ("[M]otion input may comprise translation input (moving the handheld device 10 to the right an applicable amount to change the information

displayed) or a gesture input (moving the handheld device 10 according to a particular gesture mapped to this function). As an example, one gesture may be mapped to moving the display one portion to the right, while another gesture may be mapped to moving the display two portions to the right. Thus, using translation input or gesture input, the user may navigate across desktop 140.").

To the extent a prior art reference is argued or found not to disclose the limitations addressed in this section as recited in the Asserted Claims, and as an alternative to the teachings of that reference if it discloses the limitations, the claimed features would have been obvious to modify or combine with that reference for at least the following reasons in addition to the motivations to combine identified separately in these contentions:

- All elements of the claim are disclosed in the references with no change in their respective functions, and the combination would have yielded nothing more than predictable results.
- The advantages associated with this feature were well-known and would have been appreciated by persons of ordinary skill in the art, thereby motivating the usage of this feature to combine with or modify the teachings of other references. For example, as discussed above, the use of feedback data to trigger output devices for providing sensor stimuli were well known in the art before the alleged invention, including out output devices for video game systems, which included means for communications. Proportional feedback data was also well known in the art before the alleged invention. In addition, as discussed above, output devices for providing sensory stimuli, such as sound or haptic feedback, were a well-known and conventional prior art infrastructure for providing sensory stimuli in response to

feedback data, which also would have obviously been used with movement, position, and orientation tracking and video game systems in order to provide well-known benefits and advantages such as increased immersion, entertainment, user experience, and feedback to the user. Proportional feedback data, to trigger a proportional output device stimuli was also well known in the art before the alleged invention, and provide well-known benefits and advantages, increased immersion, realism, user engagement, and entertainment.

- References disclosing these concepts teach the beneficial utility of them, including as cited in the claim charts submitted herewith. Defendants may rely upon the cited disclosures, among others, to show and illustrate the motivations to combine.

A person of ordinary skill in the art would have had a reasonable expectation of success in combining in the manner described above, as proportional feedback data, based on movement, position, and/or orientation, and the technological underpinnings behind them were well-known prior to 2004, as the Proportional feedback References cited above confirm.

Specific evidence of the motivation to combine includes the references and passages therein cited in the claim charts submitted herewith for the applicable claim limitations, which reflect the reasons and motivations to combine and modify listed above and additional reasons and motivations to combine and modify that Defendants may rely upon. Defendants also expect to rely on expert testimony regarding motivation to combine.

(20) "Activity completion feedback" References

Claim 21 of the '325 Patent recites a limitation of a system that provides feedback data to the output device of a communication device when the user has completed an activity. For purposes of these Invalidity Contentions, prior art references that disclose a system that provides

feedback data to the output device of a communication device when the user has completed an activity are "Activity completion feedback" references. While each reference that discloses any of the "Activity completion feedback" limitations as indicated in the claim charts submitted herewith is a "Activity completion feedback" reference, for convenience, the following is a non-exhaustive list of prior art references that are "Activity completion feedback" references:

- Howard '374
- Okamoto
- Nishitani
- Rosenberg
- Cunningham
- Tremblay
- Immersion 3D Interaction Product Line
- Martin '812
- Choy
- French
- Salisbury
- Natoli
- Marvit
- Woolston
- Yamashita
- Endo

Nothing about these claim limitations adds anything non-obvious over the prior art. The features of a system that provides feedback data to the output device of a communication device when the user has completed an activity were well-known in the art before the alleged invention of the Asserted Patents and are described in the disclosures of numerous references submitted and charted herewith. The claimed functionality is disclosed in the prior art cited herein, including the disclosures cited in the claim charts served herewith and within each of the foregoing identified references. Further, exemplary specific disclosures of the claimed functionality in the prior art, which disclose the applicable claim limitations and also reflect and illustrate the motivations to implement the claimed functionality and to modify and combine the teachings of the prior art to include the claimed functionality, are identified as follows:

- Cheok discloses providing visual feedback to the user after the exploration of certain areas or completion of a certain stage. *E.g.*, Cheok at 435 ("The player holds a wand in their hand as a tool for exploring the game space. The wand can be used in various ways in a different game context. In the first stage, the wand is used to shown as a virtual board to display some hint information to the players, for example, to distinguish the explored area and the unexplored area, or to warn potential dangers in neighboring grids. Figure 6 shows the content of the virtual pad during the physical space exploration. The white color indicates unexplored area. After the players obtain a high enough score by collecting the necessary treasures, they enter the second game stage, in which they should find a castle and fight a witch.").
- Ohshima teaches that "a device that physically stimulates the player such as a vibrator may be built in a band for fixing the HMD or the interactive input device,

and may feed back an action to the player in accordance with the game situation. For example, when a given player defends against an enemy's attack or defeats an enemy in the vicinity of the player, vibration as shock may be given to the player, thus providing a real presentation effect." (Ohshima, 12:36-45).

- Natoli teaches "the disclosed VR keyboard system and method generates actuation signals corresponding to the keys depression motions, and applies the actuation signals to the actuators in the VR glove to provide force feedback to the user. Accordingly, the user is provided with the physical sensation of depressing an actual keyboard key, when instead the user has depressed in VR a VR key of the VR keyboard." (Natoli, 11:1-20)
- Ueshima discloses a soccer game apparatus that provides feedback data to the output device of a communication device when the user has completed an activity. Ueshima at 6:55-7:24 ("Subsequently, the game processor 58 carries out a before shoot process in a step S4, and carries out an after-shoot process in a step S5. In the before-shoot process, the soccer ball 44 is rolled toward the player from an oblique front right, for example, and when the shoot is done by the player, the process is changed to the after-shoot process. It is noted that when a shoot timing is too early or too late, a shoot result is determined as "miss the ball", and the process is not changed to the after-shoot process. When transited to the after-shoot process, the soccer ball 44 is moved to a direction according to a timing of the shoot and a position of the soccer ball 44 as of that time, and furthermore, the goalkeeper 46 is moved to an arbitrary direction. The shoot result is determined as "goal successful" or "goal unsuccessful" in accordance with a moving direction of the

soccer ball 44 and the position of the goalkeeper 46. When the shoot result is finalized, the state is moved to a score point process in a succeeding step S6. In addition, the number of shoots is determined in the score point process, and the player is changed at a time that five shoots have been unleashed, for example. Furthermore, if both the player 1 and the player 2 carry out a shoot so that a game ending condition is satisfied, the process returns to the game mode selection (S3). It is noted that if there is an interruption by a video-synchronising signal, the process returns from a step S7 to the step S2 so as to carry out the image update. In addition, a sound process in a step S9 is carried out when a sound interruption is generated, thereby producing a game music, sound effects such as a shoot sound, and so on. If an interruption other than the sound interruption is generated, the game processor 58 receives an infrared signal (code) input from the infrared light-receiving portion 32 in a step S10."); Fig. 8.

- Marvit discloses a user input device that provides feedback when a user completes a physical gesture using the device. *E.g.*, Marvit at ¶ 102 ("In order to indicate that a particular movement of the device by a user is recognized as a particular gesture, handheld devices in some embodiments provide feedback to notify the user that the movement was in fact recognized as a gesture.").
- Klitsner teaches a user input device that provides an additional command output whenever a user successfully complies with the previous command output. *E.g.*, Klitsner at 1:58-64 ("The controller outputs a first command signal to the audible output device that relates to a first selected input device. The controller then outputs a second command signal to the audible output device relating to a second selected

input device when the first selected input device is actuated within a predetermined period of time.")

To the extent a prior art reference is argued or found not to disclose the limitations addressed in this section as recited in the Asserted Claims, and as an alternative to the teachings of that reference if it discloses the limitations, the claimed features would have been obvious to modify or combine with that reference for at least the following reasons in addition to the motivations to combine identified separately in these contentions:

- All elements of the claim are disclosed in the references with no change in their respective functions, and the combination would have yielded nothing more than predictable results.
- The advantages associated with this feature were well-known and would have been appreciated by persons of ordinary skill in the art, thereby motivating the usage of this feature to combine with or modify the teachings of other references. For example, as discussed above, the use of feedback data to trigger output devices for providing sensor stimuli were well known in the art before the alleged invention, including out output devices for video game systems, which included means for communications. Feedback data based on a user completing an activity was also well known in the art before the alleged invention. In addition, as discussed above, output devices for providing sensory stimuli, such as sound or haptic feedback, were a well-known and conventional prior art infrastructure for providing sensory stimuli in response to feedback data, which also would have obviously been used with movement, position, and orientation tracking and video game systems in order to provide well-known benefits and advantages such as increased immersion,

entertainment, user experience, and feedback to the user. Feedback data based on a user completing an activity, to trigger an output device stimuli was also well known in the art before the alleged invention, and provide well-known benefits and advantages, increased immersion, realism, user engagement, and entertainment.

- References disclosing these concepts teach the beneficial utility of them, including as cited in the claim charts submitted herewith. Defendants may rely upon the cited disclosures, among others, to show and illustrate the motivations to combine.

A person of ordinary skill in the art would have had a reasonable expectation of success in combining in the manner described above, as the technological underpinnings behind feedback data after completion of an activity were well-known prior to 2004, as the Activity completion feedback references cited above confirm.

Specific evidence of the motivation to combine includes the references and passages therein cited in the claim charts submitted herewith for the applicable claim limitations, which reflect the reasons and motivations to combine and modify listed above and additional reasons and motivations to combine and modify that Defendants may rely upon. Defendants also expect to rely on expert testimony regarding motivation to combine.

(21) "Control of object in UI and virtual three-dimensional environment" References

Claims 44 and 48 of the '483 Patent, claims 32, 49, and 50 of the '354 Patent, claims 1, 31, 32, 49, 50, 85, and 89 of the '325 Patent, and claims 45 and 46 of the '659 Patent recite limitations of an object in a user interface or computer-generated virtual three-dimensional environment moved in response to movement or position information of one or both of a first communication device and a second communication device. For purposes of these Invalidity Contentions, prior

art references that disclose an object in a user interface or computer-generated virtual three-dimensional environment moved in response to movement or position information of one or both of a first communication device and a second communication device are "Control of object in UI and virtual three-dimensional environment" references. While each reference that discloses any of the "Control of object in UI and virtual three-dimensional environment" limitations as indicated in the claim charts submitted herewith is a "Control of object in UI and virtual three-dimensional environment" reference, for convenience, the following is a non-exhaustive list of prior art references that are "Control of object in UI and virtual three-dimensional environment" references:

- Eyestone
- Okamoto
- Howard '374
- Rosenberg
- Cunningham
- Tremblay
- Immersion 3D Interaction Product Line
- Martin '812
- Daniel
- Choy
- Gombert
- Goodwin
- Deering
- Horton

- Kaplan
- Colmenarez
- French
- Hinckley
- Ohshima
- Salisbury
- Hall
- Natoli
- Marvit
- Woolston
- Yamashita
- Endo

Nothing about these claim limitations adds anything non-obvious over the prior art. The features of an object in a user interface or computer-generated virtual three-dimensional environment moved in response to movement or position information of one or both of a first communication device and a second communication device were well-known in the art before the alleged invention of the Asserted Patents and are described in the disclosures of numerous references submitted and charted herewith. The claimed functionality is disclosed in the prior art cited herein, including the disclosures cited in the claim charts served herewith and within each of the foregoing identified references. Further, exemplary specific disclosures of the claimed functionality in the prior art, which disclose the applicable claim limitations and also reflect and

illustrate the motivations to implement the claimed functionality and to modify and combine the teachings of the prior art to include the claimed functionality, are identified as follows:

- Howard '632 teaches cursor motion control based on user movement. *E.g.*, Howard '632 at 6:41-46 ("Accordingly, the present invention can also be adapted to operate in a mouse-like fashion by generating pointing Strokes. Pointing Stroke operation converts the motion vectors generated by deflection from any random rest position of the hand to any desired ending position of the hand into a Stroke of cursor motion on the computer screen.").
- Ohshami teaches controlling video game actions based on user movement. *E.g.*, Ohshami at 5:14-20 ("The game apparatus 3000 displays progress of the game on a display unit 4000 Such as a display monitor, a head mounted display (HMD) the user wears on his or her head, or the like, and the user can make actions such as loading, shooting, defense, and the like with respect to a "target as a CG image generated by the game apparatus 300 within the displayed virtual space.").
- Cunningham discloses a haptic interface system that can be used for a three-dimensional gaming environment. Cunningham at 32:55-58 ("In an alternate embodiment, the mechanism can be used for a 3-D interface device that allows a user to move a user object in three dimensions rather than the 2-D planar workspace disclosed.").
- Sachs discloses a three-dimensional drawing system wherein an object in a computer-generated virtual three-dimensional environment moves in response to movement of a stylus. Sachs at 23 ("3-Draw maintains a 3D virtual world analogous to the designer's work area. As the designer moves the Polhemus sensors

in the vicinity of the source, this motion is mapped into similar motion of virtual objects in the virtual world. This results in a one-to-one mapping of hand motions to virtual object motions.").

- Marvit discloses a user input device with a display that can be used to navigate through a user interface via gestures. *E.g.*, Marvit at ¶ 69 ("[T]ranslation of the handheld device is used to navigate through virtual desktop 90. For example, a user may move the handheld device from right to left to navigate from right to left through information of virtual desktop 90."). Further, Marvit discloses the use of the device "to navigate across the multidimensional desktop, and non-motion actions may be used to select or navigate between dimensions." (Marvit, ¶ 87).
- Natoli teaches "[t]he term "virtual reality" and its abbreviation "VR" are herein defined to include, but not to be limited to, visual and/or other sensory applications implemented using software and/or hardware to simulate and/or provide representations of environments which may be different from the physical environment of the user. Such VR may provide visual and/or multimedia zones, worlds, and work areas in which the user and/or other software applications may change and interact with representations of elements in the VR environment. For example, in a VR world, a graphic representation of a switch may be changed to represent the flicking or switching of the switch, which may have an associated switch-flicking sound which is activated by flicking the switch." (Natoli, 5:7-27.)
- Choy teaches "this system would have the virtual human replaced by another user. His or her movements (tracked by the tracking hardware) would be applied to the polygon mesh representing them within the virtual world. Their representation

within the world is known as an avatar." (Choy, 10:58-11:20.) Choy further discloses "[a]s well as navigating within the environment, the user must be allowed to interact with various virtual objects. For instance he may wish to pick up a glass of wine. This programming problem can be broken down into a number of stages: Detect the 3D world position of the users [sic] hands. If the hand is within a specified range of the object, perform the following tests: Can the object be picked up? If so, check the positions of the fingers on the hand and attempt to recognise a gesture which indicates the object requires picking up. If the appropriate gesture is made, attach the object to the hand as long as the gesture remains similar. If the hand gesture changes, drop the object until it hits a surface in the world. If the object is not within range, check any other objects. Basically, the users hand position within the virtual world can be tracked using the motion tracking hardware mentioned previously. This position is then continually monitored against certain types of objects that are previously flagged as 'pickup-able'. For instance, a bed would not be flagged as such as this would not be in the context of the experience, however, a glass of wine would be. Each of these flagged objects would have certain attributes programmed." (Choy, 12:51-13:38.)

- Daniel states, "[T]he input device may be used to capture finger and thumb movements and at the same time a computing device can track the hand movements through space so that a click and drag operation can be accomplished with the input device as described in more detail below. The captured data is in the form of digital data, which allows the input device to be used as an interactive device with a computer program. The movement of particular fingers is thus transferred to

particular protrusions of the input device. These movements are translated and then transferred to a computing system to initiate a command, respond to a query, provide a command, maneuver objects in an interactive video game, etc." (Daniel ¶ 32.)

- Goodwin states, "[T]he invention relates to an apparatus that permits a user to select an object in a three-dimensional modeling environment. The apparatus includes a computer that supports a three-dimensional modeling environment application, an input device that provides user input to the computer, the input device having at least three degrees of freedom, a modeling module that, when operating, generates the three-dimensional modeling environment using the computer, the three-dimensional modeling environment adapted to model one or more virtual objects and to employ a three-dimensional cursor, and a selection module responsive to user commands that, when operating, selects one of the virtual objects based on a two-dimensional positional correspondence of the object and the cursor. In some embodiments, the apparatus further includes a display device that provides a two-dimensional display space for presenting to the user representations of the virtual object and the three-dimensional cursor in the modeling environment." (Goodwin, 4:4-22.)
- French teaches "[t]he present invention relates to a system for assessing movement and agility skills and, in particular to a wireless position tracker for continuously tracking and determining player position during movement in a defined physical space through player interaction with tasks displayed in a computer generated, specially translated virtual space for the quantification of the player's movement

and agility skills based on time and distance traveled in the defined physical space." (French, 1:25-33)

To the extent a prior art reference is argued or found not to disclose the limitations addressed in this section as recited in the Asserted Claims, and as an alternative to the teachings of that reference if it discloses the limitations, the claimed features would have been obvious to modify or combine with that reference for at least the following reasons in addition to the motivations to combine identified separately in these contentions:

- All elements of the claim are disclosed in the references with no change in their respective functions, and the combination would have yielded nothing more than predictable results.
- The advantages associated with this feature were well-known and would have been appreciated by persons of ordinary skill in the art, thereby motivating the usage of this feature to combine with or modify the teachings of other references. For example, it was advantageous to provide the video game and computer users the ability to interact with the virtual display through their movement, positioning, and orientation of a communication device or controller to increase the realistic feeling of the video game, increase the user's enjoyability, and provide other benefits to users. A skilled artisan would recognize the benefits of permitting the movement, positioning, and/or orientation of a communication device or controller to affect the virtual display of a video game or computer display. In addition, video game systems display a virtual three-dimensional environment, were a well-known and conventional prior art infrastructure for providing sensory stimuli, which also would have obviously been used with movement, position, and orientation tracking

in order to provide well-known benefits and advantages such as increased immersion, entertainment, and user experience.

- References disclosing these concepts teach the beneficial utility of them, including as cited in the claim charts submitted herewith. Defendants may rely upon the cited disclosures, among others, to show and illustrate the motivations to combine.

A person of ordinary skill in the art would have had a reasonable expectation of success in combining in the manner described above, virtual reality generally, computer generated virtual environments, the control of objects on a display, and the technological underpinnings behind them were well-known prior to 2004, as the Control of object in UI and virtual three-dimensional environment References cited above confirm.

Specific evidence of the motivation to combine includes the references and passages therein cited in the claim charts submitted herewith for the applicable claim limitations, which reflect the reasons and motivations to combine and modify listed above and additional reasons and motivations to combine and modify that Defendants may rely upon. Defendants also expect to rely on expert testimony regarding motivation to combine.

(22) "Verbal input" References

Claims 33 and 50 of the '354 Patent and claims 14, 27, 33, 50, and 103 of the '325 Patent recite limitations of a system that is interactive and responds to verbal command input from the user. For purposes of these Invalidity Contentions, prior art references that disclose a system that is interactive and responds to verbal command input from the user are "Verbal input" references. While each reference that discloses any of the "Verbal input" limitations as indicated in the claim charts submitted herewith is a "Verbal input" reference, for convenience, the following is a non-exhaustive list of prior art references that are "Verbal input" references:

- Howard '374
- Cunningham
- Tremblay
- Martin '812
- Choy
- Goodwin
- Horton
- Kaplan
- Natoli
- Marvit
- Wang
- Ozawa
- DiCesare
- Sega Dreamcast Seaman
- Hey You, Pikachu Voice Recognition Unit

Nothing about these claim limitations adds anything non-obvious over the prior art. The features of a system that is interactive and responds to verbal command input from the user were well-known in the art before the alleged invention of the Asserted Patents and are described in the disclosures of numerous references submitted and charted herewith. The claimed functionality is disclosed in the prior art cited herein, including the disclosures cited in the claim charts served herewith and within each of the foregoing identified references. Further, exemplary specific disclosures of the claimed functionality in the prior art, which disclose the applicable claim

limitations and also reflect and illustrate the motivations to implement the claimed functionality and to modify and combine the teachings of the prior art to include the claimed functionality, are identified as follows:

- Howard '632 teaches verbal input control. *E.g.*, Howard '632 at 3:22-25 ("The housing may also optionally include a motion detector, Such as an accelerometer or gyroscope, an environmental condition Sensor, or a voice recognition Sensor."); 5:55-58 ("Audio or voice actuation, or a particular arm movement (e.g. as if reaching for a mouse) could be employed alternatively or in combination to employ the demand mode discussed below.").
- Cunningham discloses a haptic interface system that is interactive and responds to verbal command input from the user. Cunningham at 38:10-17 ("Other input devices 600 can optionally be included in system 100 and send input signals to microprocessor 570 and/or the computer 210. Such input devices can include buttons, such as buttons 405 on force feedback mouse 400, used to supplement the input from the user to a simulation, GUI, game, etc. Also, dials, Switches, Voice recognition hardware (with software implemented by computer 210), or other input mechanisms can be used.").
- Tremblay discloses a tactile feedback interface that is interactive and responds to verbal command input from the user. Tremblay at 3:53-62 ("The user's voice may constitute a measured physical state variable, where his spoken words are sensed and/or recognized to generate a corresponding activating signal. The physical state signal is a machine readable measurement of the physical State variables. The state signal is presented to the signal processor which interprets the state, and then

determines how and when to activate the vibrotactile units accordingly. The signal processor produces an activating signal which may be in response to an event it interprets from the state signal.").

- Apseloff discloses a user motion-sensing system to translate user exercise into video game motion, and it accommodates voice command inputs: "The Voice commands will vary with each application, with a Simple System utilizing the commands 'left', 'right' and 'back', where the first two cause perceived movement of 45 degrees to either Side and the last caused perceived movement of 180 degrees or a reversal of view. Object commands such as 'boat', 'car', 'plane', 'rocket', 'ladder', 'bridge', 'tunnel', 'shovel', 'drill', 'sword', 'rifle', etc. could provide access to vehicles and tools necessary to access certain parts of the Virtual worlds in a manner well known to game players." (Apseloff, 3:35-45).
- Mitsunari teaches an interactive video game system that recognizes voice commands: "When a player enters a voice from a microphone 60, a voice recognition unit 50 recognizes a word corresponding to the voice and sends the result to the video game machine body 10. The video game machine body 10 causes the state of a dialogue partner object displayed on the television receiver 30 to change on the basis of the recognized result received from the voice recognition unit 50." (Mitsunari, Abstract).
- Marvit discloses that user input can be in the form of a verbal command. Marvit at ¶ 76 ("Any particular user-action may be implemented to act as a trigger to switch between different input modes, such as between different motion input modes. In

some embodiments, a voice command or physical action upon the device (e.g., a device or screen tap) may be utilized to switch input modes.").

- Natoli recognizes that "voice recognition applications have been developed which recognize the voice and inflections of speech of users, to allow the user to enter data and commands orally, as opposed to tactilely through a keyboard and/or keypad to enter alphanumeric data and commands." (Natoli, 1:31-35.)
- Choy teaches that "[t]he users must also be allowed to verbally communicate with one another. This can be achieved by linking the audio cards on both systems to allow for this as the users may be in separate rooms." (Choy, 11:1-12.)
- Goodwin discloses "[t]he user selects a virtual object, as indicated at box 314, by manipulating the three-dimensional cursor which is responsive to the motions of the interface 10 so as to coincide with the virtual object in two of three dimensions, such as the two dimensions of the two-dimensional display, and by issuing a selection command. The selection command can be any action that the computer is capable of sensing and that it is programmed to recognize, such as, for example, pushing a button, making an audible sound, or pressing a keyboard key. The selection process is monitored by the selection module." (Goodwin, 9:30-40.)

To the extent a prior art reference is argued or found not to disclose the limitations addressed in this section as recited in the Asserted Claims, and as an alternative to the teachings of that reference if it discloses the limitations, the claimed features would have been obvious to modify or combine with that reference for at least the following reasons in addition to the motivations to combine identified separately in these contentions:

- All elements of the claim are disclosed in the references with no change in their respective functions, and the combination would have yielded nothing more than predictable results.
- The advantages associated with this feature were well-known and would have been appreciated by persons of ordinary skill in the art, thereby motivating the usage of this feature to combine with or modify the teachings of other references. For example, the use of responding to verbal command inputs was known in the prior art would have been recognized as a convenient and efficient way for a user to input instructions hands-free. Systems containing for example, a microphone, which could provide verbal input by the user were well known in the art before the alleged invention, and provide well-known benefits and advantages, such as hand-free input, input features for the people with disabilities, and quicker input speeds.
- References disclosing these concepts teach the beneficial utility of them, including as cited in the claim charts submitted herewith. Defendants may rely upon the cited disclosures, among others, to show and illustrate the motivations to combine.

A person of ordinary skill in the art would have had a reasonable expectation of success in combining in the manner described above, as video game systems responding to verbal input were well-known prior to 2004, as the Verbal input References cited above confirm.

Specific evidence of the motivation to combine includes the references and passages therein cited in the claim charts submitted herewith for the applicable claim limitations, which reflect the reasons and motivations to combine and modify listed above and additional reasons and motivations to combine and modify that Defendants may rely upon. Defendants also expect to rely on expert testimony regarding motivation to combine.

(23) "Verbal output" References

Claims 24, 35, 65, 86, 90, and 107 of the '325 Patent recite limitations of a system that provides real-time verbal command output to user. For purposes of these Invalidity Contentions, prior art references that disclose a system that provides real-time verbal command output to user are "Verbal output" references. While each reference that discloses any of the "Verbal output" limitations as indicated in the claim charts submitted herewith is a "Verbal output" reference, for convenience, the following is a non-exhaustive list of prior art references that are "Verbal output" references:

- Howard '374
- Okamoto
- Nishitani
- Rosenberg
- Tremblay
- Choy
- Gombert
- Natoli
- Wang
- Ozawa
- DiCesare
- Sega Dreamcast Seaman
- Hey You, Pikachu Voice Recognition Unit

Nothing about these claim limitations adds anything non-obvious over the prior art. The features of a system that provides real-time verbal command output to user were well-known in the art before the alleged invention of the Asserted Patents and are described in the disclosures of numerous references submitted and charted herewith. The claimed functionality is disclosed in the prior art cited herein, including the disclosures cited in the claim charts served herewith and within each of the foregoing identified references. Further, exemplary specific disclosures of the claimed functionality in the prior art, which disclose the applicable claim limitations and also reflect and illustrate the motivations to implement the claimed functionality and to modify and combine the teachings of the prior art to include the claimed functionality, are identified as follows:

- Latypov concerns a system for determining the position and orientation of users playing interactive computer games, wherein the system provides verbal feedback to the user. Latypov at 13:33-36 ("A computer according to an inputted programme by comparing the user's movements tracked through user's position and orientation will be capable to state comments and advice.").
- Marvit discloses a handheld device which provides speech feedback to the user. Marvit at ¶¶ 102-103 ("As discussed above, particular embodiments allow a user to move handheld device 10 according to a gesture to perform particular functions or operations. In some cases however, a user may not move the device according to the particular gesture intended, and the device may, as a result, not be able to recognize the movement as the intended gesture. In order to indicate that a particular movement of the device by a user is recognized as a particular gesture, handheld devices in some embodiments provide feedback to notify the user that the movement was in fact recognized as a gesture. [0103] This feedback may comprise

an audio format, such as speech, a beep, a tone or music, a visual format, such as an indication on the device display, a vibratory format or any other suitable feedback format. Audio feedback may be provided through a user interface speaker or headphone jack of device 10, and vibratory feedback may be provided through a user interface vibration generation module of US 2005/0212753 Al device 10. Audio, visual and vibratory feedback may be varied to provide capability for multiple feedback indicators.").

- Cheok discloses a reality game system which commands the player to perform a task. Cheok at 437 ("After the user is fully immersed in the virtual lands, she can hear the 3D sound of the princess's voice calling ''help, help . . .'', which helps her to localize the relative position of the princess and thus guides her toward the princess. A game rule is set that the princess cannot be rescued unless both co-players are standing in front of the princess. Therefore, the user needs to find her co-player and invite the co-player to walk together toward the princess.").
- Natoli discloses "[t]he term "virtual reality" and its abbreviation "VR" are herein defined to include, but not to be limited to, visual and/or other sensory applications implemented using software and/or hardware to simulate and/or provide representations of environments which may be different from the physical environment of the user. Such VR may provide visual and/or multimedia zones, worlds, and work areas in which the user and/or other software applications may change and interact representations of elements in the VR environment. For example, in a VR world, a graphic representation of a switch may be changed to

represent the flicking or switching of the switch, which may have an associated switch-flicking sound which is activated by flicking the switch." (Natoli, 5:7-27.)

- Choy teaches "[s]ound handling is a desirable component of the preferred embodiment since sound is obviously an important part of the overall experience. Sound must be sampled at a high enough bit-rate and frequency to make it realistic. Provision for positional audio must also be made. In other words a sound of a car in the virtual world must appear to originate from the car. This is known as 3D sound localisation, and software development kits are available to provide the programmer with the necessary algorithms to program such sounds. The sound can be positioned within the virtual world in a similar way to positioning a polygon mesh object. However, the sounds would also have a number of other attributes, such as: Minimum and maximum range. The sound at a particular point would change volume according to where the user is in relation to these specified ranges. Sound cone. This is made up of an inside cone and an outside cone. Within the inside cone, the volume of the sound would be at a defined level (also dependant on the range from the sound source). Outside the outside cone, this volume would be attenuated by a specified number of decibels, as set by the application. The angle between the inside and the outside cones is a zone of transition from the inside volume to the outside volume. Velocity. This attribute would be used for creating Doppler shift in the sound. Applying these kind of sound properties can add dramatic effects to the experience. For example, you could position a sound source in the centre of a room, setting its orientation toward an open door in a hallway. Then set the angle of the inside cone so that it extends to the width of the doorway,

make the outside cone a bit wider, and set the outside cone volume to inaudible. A user moving along the hallway will begin to hear the sound when near the doorway, and the sound will be loudest as the listener passes in front of the open door. These sounds can also be positioned at the mouth of the virtual human for speech. The speech sound samples would be linked to a set of mouth and facial animations, thus it would appear that this virtual human is speaking. The possibilities are endless." (Choy, 11:34-12:8)

- Gombert states, "The input device in accordance with the invention is not only solely applicable to controlling the motions of parts of the object. Instead, in addition to controlling the motions of parts of the object it is possible to advantage to combine and/or vary tones and/or music of any kind. This would mean, for example, that when the operator is controlling a higher velocity of the input device, tones such as e.g. walking noises or music sequences sound and/or change in thus enabling friction sounds or also dramatic music sequences to be combined with the motional control in effectively enhancing the reality and naturalness." (Gombert, ¶ 13.)
- Klitsner discloses an input device that provides a series of verbal command outputs. *E.g.* Klitsner at Abstract ("The controller outputs a first command signal to the audible output device that relates to a first selected input device. The controller then outputs a second command signal to the audible output device relating to a second selected input device when the first selected input device is actuated within a predetermined period of time."). Further, Klitsner teaches that "[p]referably, the audible output device outputs a different voice message corresponding to each

respective command signal. For example, the voice message corresponding to a command signal relating to the pressure switch instructs a user to press the pressure switch. Similarly, the voice message corresponding to a command signal relating to the pull switch instructs the user to pull the pull switch, and the voice message corresponding to a command signal relating to the rotational switch instructs the user to rotate the rotational switch." (Klitsner, 2:9-18).

To the extent a prior art reference is argued or found not to disclose the limitations addressed in this section as recited in the Asserted Claims, and as an alternative to the teachings of that reference if it discloses the limitations, the claimed features would have been obvious to modify or combine with that reference for at least the following reasons in addition to the motivations to combine identified separately in these contentions:

- All elements of the claim are disclosed in the references with no change in their respective functions, and the combination would have yielded nothing more than predictable results.
- The advantages associated with this feature were well-known and would have been appreciated by persons of ordinary skill in the art, thereby motivating the usage of this feature to combine with or modify the teachings of other references. For example, verbal command output to the user was known in the prior art would have been recognized as a convenient and efficient way for a user to receive audio feedback. Systems containing for example, a speaker, which could provide verbal output to the user were well known in the art before the alleged invention, and provide well-known benefits and advantages, such as greater immersion, entertainment, feedback, and providing confirmation to the user of their actions.

- References disclosing these concepts teach the beneficial utility of them, including as cited in the claim charts submitted herewith. Defendants may rely upon the cited disclosures, among others, to show and illustrate the motivations to combine.

A person of ordinary skill in the art would have had a reasonable expectation of success in combining in the manner described above, as video game systems providing verbal command outputs were well-known prior to 2004, as the Verbal output References cited above confirm.

Specific evidence of the motivation to combine includes the references and passages therein cited in the claim charts submitted herewith for the applicable claim limitations, which reflect the reasons and motivations to combine and modify listed above and additional reasons and motivations to combine and modify that Defendants may rely upon. Defendants also expect to rely on expert testimony regarding motivation to combine.

(24) "Receiving/tracking array" References

Claim 63 of the '354 Patent recites a limitations of a system with an array of receiving devices for tracking the movement of a communication device or controller. For purposes of these Invalidity Contentions, prior art references that disclose a system with an array of receiving devices for tracking the movement of a communication device or controller are "Receiving/tracking array" references. While each reference that discloses any of the "Receiving/tracking array" limitations as indicated in the claim charts submitted herewith is a "Receiving/tracking array" reference, for convenience, the following is a non-exhaustive list of prior art references that are "Receiving/tracking array" references:

- Howard '374
- Martin '812
- Choy

- Kaplan
- Colmenarez
- Hall
- Marvit
- Woolston

Nothing about these claim limitations adds anything non-obvious over the prior art. The features of a system with an array of receiving devices for tracking the movement of a communication device or controller were well-known in the art before the alleged invention of the Asserted Patents and are described in the disclosures of numerous references submitted and charted herewith. The claimed functionality is disclosed in the prior art cited herein, including the disclosures cited in the claim charts served herewith and within each of the foregoing identified references. Further, exemplary specific disclosures of the claimed functionality in the prior art, which disclose the applicable claim limitations and also reflect and illustrate the motivations to implement the claimed functionality and to modify and combine the teachings of the prior art to include the claimed functionality, are identified as follows:

- Howard '632 teaches an array of optical detectors that track finger position and movement. *E.g.*, Howard '632 at 4:34-53 ("As shown generally in FIG. 2 and explained in greater detail in the above-referenced related patents and applications, light emitters 32 on housing 22, which are preferably light emitting diodes ("LEDs") operating in the infrared range, project well-defined beams of energy 34 over a limited Solid angle generally parallel to the palm of the operator's hand. The Solid angle of the beams is preferably limited Such that the illuminated regions will

not overlap at a distance from housing 22 that is closer than the fingertips of the operator. Thus, movement of the operators hand, Such as movement of a finger in a motion Similar to pressing a key on a keyboard, will cause the tip of the operator's finger to be illuminated by a beam 34. This illumination is reflected 34a from the operator's fingertip and detected by a detector 36, also on housing 22. Thus, by correlation of reflected beams of light 34a with emitted beams of light 34, the placement of any finger or other object can be not only detected but also differentiated from any other location, and an appropriate coded signal 30 can be sent from housing 22 to base station 24.").

- Cheok discloses an array of tracking devices to monitor and track the head and hand position of players as they move around in the game space. *E.g.*, Cheok at 434 ("Intersense IS900 inertial acoustic hybrid tracking devices are mounted on the ceiling. While players walk around in the game space, their head and hand position are tracked by the tracking devices.").

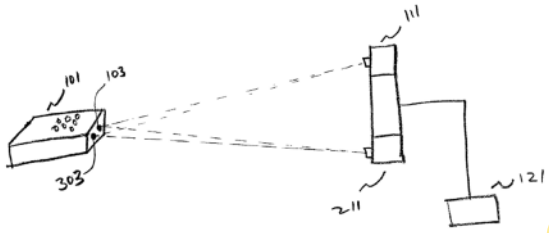
- Junichi discloses a game control unit with a position detecting system to track movement. Junichi at Abstract ("PROBLEM TO BE SOLVED: To detect the position of a prescribed picture displayed on a display device in a non-contact way. SOLUTION: A position detecting system 1 is provided with a game enclosure 10, a controller type image pickup device 11, a displaying section 12, and a loudspeaker 13 for photographing the displaying section 12 by means of the image pickup device 11. A game control section 32 installed to the enclosure 10 detects the movement of an identifier 14 by comparing the pictures of the displaying section

12 photographed by means of the device 11 with each other and displays an aiming point 16.").

- Martin '812 discloses an apparatus and method for interfacing the motion of a user-manipulable object with a computer system, wherein the contact and non-contact sensors are used to gather position data. Martin '812 at 10:10-32 ("Sensors 52 can be, for example, relative optical encoders which provide signals to measure the angular rotation (i.e., rotational position) of a shaft of the transducer. The electrical outputs of the encoders are routed to electronic interface 16, as detailed with reference to FIG. 9. Other types of sensors 52 can also be used, such as potentiometers, etc. In addition, it is also possible to use non-contact Sensors at different positions relative to mechanical apparatus 14. For example, a Polhemus (magnetic) sensor can detect magnetic fields from objects; or, an optical sensor such as lateral effect photo diode includes an emitter/detector pair that detects positions of the emitter with respect to the detector in one or more degrees of freedom; for example, a photo diode by Hamamatsu Co., part S.1743, can be used. These types of sensors are able to detect the position of object 12 in particular degrees of freedom without having to be coupled to a joint of the mechanical apparatus. Alternatively, sensors can be positioned at other locations of relative motion or joints of mechanical apparatus 14. In addition, velocity sensors (e.g., tachometers) and acceleration sensors (e.g., accelerometers) can also be used instead of or in addition to position sensors.").
- Kaplan discloses an array of tracking devices. For example, Kaplan teaches "a system for controlling an electronic device. The system comprises at least two

transmitters adapted to be worn on a user's fingers. At least three receivers are configured to receive a signal from the transmitters. A controller is configured to generate a control signal based, at least in part, on changes to a location of at least one of the transmitters. The controller is configured to calculate the location of each of the transmitters based on a distance of each of the transmitters measured from each of the receivers." (Kaplan, ¶ 16.) Kaplan further teaches "In another embodiment of the present invention, each mobile transceiver contains a plurality of transceivers. By including a plurality of transceivers in each mobile transceiver, the vector of the user's hand can be more accurately determined and greater functionality based on the relative position and vector of mobile transceivers 110 and 115 can be achieved." (Kaplan, ¶ 79.)

- Mishra discloses "[t]he receiver 104 may include a plurality of detectors or sensors, such as infrared (IR) sensors, radio frequency (RF) sensors, or other sensors to detect other types of wireless signals." (Mishra, 2:33-36).
- Barney teaches "[v]arious wireless receivers or actuators are distributed throughout the play facility to facilitate such interaction and to facilitate full immersion in the fantasy of practicing, performing and mastering "real' magic." (Barney, 2:33-37).
- Colmenarez describes an input device tracking system with the following structure:



(Colmenarez, Fig.3).

- Marvit teaches that a user input device can be used to control an array of receiving devices. *E.g.*, Marvit at ¶ 6. ("[M]otion input of one handheld device may be used to control a plurality of other devices thus facilitating control of the other devices for a user."). Marvit further discloses that the receiving devices can be "other devices through a network. Thus, devices controlled through motion input of device 10 may be at any location with respect to device 10, such as in the same room or across a country." (Marvit, ¶ 120).
- Björk teaches "[t]o determine the physical locations of the players, we connected proximity sensors to the handheld computers, as well as placed similar sensors at different locations in the arena. The players' movement between these locations triggers different game events." (Björk, p. 424.)

To the extent a prior art reference is argued or found not to disclose the limitations addressed in this section as recited in the Asserted Claims, and as an alternative to the teachings of that reference if it discloses the limitations, the claimed features would have been obvious to modify or combine with that reference for at least the following reasons in addition to the motivations to combine identified separately in these contentions:

- All elements of the claim are disclosed in the references with no change in their respective functions, and the combination would have yielded nothing more than predictable results.
- The advantages associated with this feature were well-known and would have been appreciated by persons of ordinary skill in the art, thereby motivating the usage of this feature to combine with or modify the teachings of other references. For example, as disclosed above, various remote processing systems for receiving data

were well known in the art before the alleged invention. In addition, processing systems, such as an array of receiving devices, for receiving movement, position and orientation data from an input device such as a haptic feedback controller, were a well-known and conventional prior art infrastructure, which also would have obviously been used with movement, position, and orientation tracking in order to provide well-known benefits and advantages such as providing processing of the sensor data, processing movement, position, and orientation, and outputting the data to another remote processor. Moreover, the use of multiple sensors in an array was known and inherent in receiving tracking data.

- References disclosing these concepts teach the beneficial utility of them, including as cited in the claim charts submitted herewith. Defendants may rely upon the cited disclosures, among others, to show and illustrate the motivations to combine.

A person of ordinary skill in the art would have had a reasonable expectation of success in combining in the manner described above, as receiving arrays and the technological underpinnings behind them were well-known prior to 2004, as the Receiving/tracking array References cited above confirm.

Specific evidence of the motivation to combine includes the references and passages therein cited in the claim charts submitted herewith for the applicable claim limitations, which reflect the reasons and motivations to combine and modify listed above and additional reasons and motivations to combine and modify that Defendants may rely upon. Defendants also expect to rely on expert testimony regarding motivation to combine.

(25) "Strap" References

Claims 55, 63, and 72 of the '354 Patent and claims 55, 63, and 72 of the '325 Patent recite limitations of a strap connected to a communication device for securing or attaching it to a user's wrist. For purposes of these Invalidity Contentions, prior art references that disclose a strap connected to a communication device for securing or attaching it to a user's wrist are "Strap" references. While each reference that discloses any of the "Strap" limitations as indicated in the claim charts submitted herewith is a "Strap" reference, for convenience, the following is a non-exhaustive list of prior art references that are "Strap" references:

- Howard '374
- Nishitani
- Tremblay
- Immersion 3D Interaction Product Line
- Daniel
- Horton
- Ohshima
- McRae
- Cartabiano
- Powell
- Schultz
- Attenni

Nothing about these claim limitations adds anything non-obvious over the prior art. The features of a strap connected to a communication device for securing or attaching it to a user's

wrist were well-known in the art before the alleged invention of the Asserted Patents and are described in the disclosures of numerous references submitted and charted herewith. The claimed functionality is disclosed in the prior art cited herein, including the disclosures cited in the claim charts served herewith and within each of the foregoing identified references. Further, exemplary specific disclosures of the claimed functionality in the prior art, which disclose the applicable claim limitations and also reflect and illustrate the motivations to implement the claimed functionality and to modify and combine the teachings of the prior art to include the claimed functionality, are identified as follows:

- Tremblay discloses a tactile feedback interface featuring vibrotactile units with fastening means ("a strap"). Tremblay at 11:58-67 ("FIG. 13 shows a vibrotactile unit and fastening means where no casing is required for the mass-moving actuator/mass assembly. A small rigid or semi-rigid structure (1302) elevates the vibrotactile unit above the fingertip in such a way that the finger cannot interfere with the rotation of the eccentric mass (1301) about the main axis of the shaft (1304) of the mass-moving motor (1300). The structure (1302) is attached to the fingertip using a strap (1303) which can be rigid or flexible and which can be either an integral or separate part of the structure."); Fig. 13; Fig. 18A; Fig. 18B.
- The Immersion 3D Interaction Product Line discloses a tracking device featuring a wristband. *Cyberglove* at 1 ("Many applications require measurement of the position and orientation of the forearm in space. To accomplish this, mounting provisions for Polhemus and Ascension 6 DOF (degrees of freedom) tracking sensors are available for the glove wristband. Tracking sensors are not included in the basic CyberGlove system, but are available as an option from Immersion 3D

and are supported in the VirtualHand® software. The CyberGlove has a software programmable switch and LED on the wristband to permit the system software developer to provide the CyberGlove wearer with additional input/output capability.").

- Daniel states, "Of course, finger straps, such as VELCRO straps, may be incorporated to secure the input device to the user's hand in one embodiment of the invention. The material of the protrusions is selected such that, the material does not easily slide off of the fingers while a user is holding the input device." (Daniel ¶ 35.)
- Horton teaches the use of a wrist band or similar device attached to a user to monitor the user's movement. (Horton, 5:7-13.)

To the extent a prior art reference is argued or found not to disclose the limitations addressed in this section as recited in the Asserted Claims, and as an alternative to the teachings of that reference if it discloses the limitations, the claimed features would have been obvious to modify or combine with that reference for at least the following reasons in addition to the motivations to combine identified separately in these contentions:

- All elements of the claim are disclosed in the references with no change in their respective functions, and the combination would have yielded nothing more than predictable results.
- The advantages associated with this feature were well-known and would have been appreciated by persons of ordinary skill in the art, thereby motivating the usage of this feature to combine with or modify the teachings of other references. For example, the use of a strap for securing a device to a user's wrist or limb was well

known in the art before the alleged invention. In addition, hand-held communication devices, utilizing a strap, were a well-known and conventional prior art infrastructure, which also would have obviously been used with movement, position, and orientation tracking hand-held devices in order to provide well-known benefits and advantages such as increased safety, security, and comfort.

- References disclosing these concepts teach the beneficial utility of them, including as cited in the claim charts submitted herewith. Defendants may rely upon the cited disclosures, among others, to show and illustrate the motivations to combine.

A person of ordinary skill in the art would have had a reasonable expectation of success in combining in the manner described above, as the use of straps for securing a hand-held communication device to a user's wrist, and the technological underpinnings behind them were well-known prior to 2004, as the Strap References cited above confirm.

Specific evidence of the motivation to combine includes the references and passages therein cited in the claim charts submitted herewith for the applicable claim limitations, which reflect the reasons and motivations to combine and modify listed above and additional reasons and motivations to combine and modify that Defendants may rely upon. Defendants also expect to rely on expert testimony regarding motivation to combine.

(26) "Scoring criteria" References

Claim 22 of the '325 Patent recite a limitation of a system that modulates activity challenges based on scoring criteria. For purposes of these Invalidity Contentions, prior art references that disclose a system that modulates activity challenges based on scoring criteria are "Scoring criteria" references. While each reference that discloses any of the "Scoring criteria"

limitations as indicated in the claim charts submitted herewith is a "Scoring criteria" reference, for convenience, the following is a non-exhaustive list of prior art references that are "Scoring criteria" references:

- French
- Ohshima
- Okada
- Hall-Tipping
- Pope
- Takemoto
- Liverance

Nothing about these claim limitations adds anything non-obvious over the prior art. The features of a system that modulates activity challenges based on scoring criteria were well-known in the art before the alleged invention of the Asserted Patents and are described in the disclosures of numerous references submitted and charted herewith. The claimed functionality is disclosed in the prior art cited herein, including the disclosures cited in the claim charts served herewith and within each of the foregoing identified references. Further, exemplary specific disclosures of the claimed functionality in the prior art, which disclose the applicable claim limitations and also reflect and illustrate the motivations to implement the claimed functionality and to modify and combine the teachings of the prior art to include the claimed functionality, are identified as follows:

- Cheok discloses providing visual feedback to the user after the exploration of certain areas or completion of a certain stage. *E.g.*, Cheok at 435 ("The player holds a wand in their hand as a tool for exploring the game space. The wand can

be used in various ways in a different game context. In the first stage, the wand is used to shown as a virtual board to display some hint information to the players, for example, to distinguish the explored area and the unexplored area, or to warn potential dangers in neighboring grids. Figure 6 shows the content of the virtual pad during the physical space exploration. The white color indicates unexplored area. After the players obtain a high enough score by collecting the necessary treasures, they enter the second game stage, in which they should find a castle and fight a witch.").

- French teaches "the virtual opponent is responsive to, and interactive with, the player in real time without any perceived visual lag. The virtual opponent continually delivers and/or responds to stimuli to create realistic movement challenges for the player" (French, Abstract), such stimuli comprising calculated scores like "Compliance" and "Dynamic Reaction Time." (French, 2:21-53).
- Björk describes a game involving a set of input devices and receivers wherein a user has an experience score that determines what missions he or she can accept. Björk at p.424 ("The first time a player joins the game, he or she is a newbie, that is, a beginner. In order to advance from newbie to full-fledged captain, the player must solve the newbie mission, which is assigned by the Viceroy."). Björk further teaches "[t]he ships allow the captains to sail the ocean and transport commodities from the different islands in order to be sold at markets. All ships are equipped with cannons and can hold a number of crew members. Early in the game, captains are commissioned small and simple ships with low firepower. However, as captains successfully complete missions, they are rewarded larger and sturdier

ships. If a ship sinks in battle, or if the crew is eaten by vicious cannibals or otherwise lost while exploring islands, the game is over for the player." (Björk, p.424.)

- Ueshima discloses a soccer game apparatus that modulates activity challenges based on scoring criteria. Ueshima at 3:32-34 ("In addition, a score display portion 51 for displaying a score of players 1 and 2 is formed on an upper left of the screen."); 6:55-7:13 ("Subsequently, the game processor 58 carries out a before shoot process in a step S4, and carries out an after-shoot process in a step S5. In the before-shoot process, the soccer ball 44 is rolled toward the player from an oblique front right, for example, and when the shoot is done by the player, the process is changed to the after-shoot process. It is noted that when a shoot timing is too early or too late, a shoot result is determined as "miss the ball", and the process is not changed to the after-shoot process. When transited to the after-shoot process, the soccer ball 44 is moved to a direction according to a timing of the shoot and a position of the soccer ball 44 as of that time, and furthermore, the goalkeeper 46 is moved to an arbitrary direction. The shoot result is determined as "goal successful" or "goal unsuccessful" in accordance with a moving direction of the soccer ball 44 and the position of the goalkeeper 46. When the shoot result is finalized, the state is moved to a score point process in a succeeding step S6. In addition, the number of shoots is determined in the score point process, and the player is changed at a time that five shoots have been unleashed, for example. Furthermore, if both the player 1 and the player 2 carry out a shoot so that a game

ending condition is satisfied, the process returns to the game mode selection (S3).");

Fig. 8.

- Toshimasa discloses a game system that modulates activity challenges based on the user's score. Toshimasa at ¶ 54 ("Whether or not the timing mark 103 is omitted may be determined based on the skill of the player. For example, when the skill of the player does not reach a certain level, by starting the above-mentioned operation, it is possible to lower the degree of difficulty of the game and to attract the player's interest in the game. A skill of a player can be determined based on, for example, a score during a game. In addition, such an operation may be started based on a predetermine operation of the player.").
- Toshihiko discloses a music game that modulates difficulty level based on a player's score. Toshihiko at ¶ 5 ("In order to achieve the first object, a first aspect of the present invention provides a music score display method for displaying a musical score in accordance with music and calculating music score for counting points according to a timing of an input operation by a player A game device for a game, comprising: means for separately counting scores of two players; means for calculating a score difference between two players; a game for two players And a means for determining a difficulty level to be given to the degree of difficulty and changing the difficulty level of the game for at least one player so that the difficulty difference is realized or the score difference is reduced As shown in FIG.").
- Ohshima discloses "wherein a plurality of players (three players in this embodiment) share an identical MR space, play a game for defeating enemies while ducking attacks of enemies appearing in the MR space and competing with other

players for the number of enemies he or she shoots down or score until the time or damage by enemy attacks reaches a given level, and can input the following commands using the interactive input device 102." (Ohshima, 7:13-21.)

To the extent a prior art reference is argued or found not to disclose the limitations addressed in this section as recited in the Asserted Claims, and as an alternative to the teachings of that reference if it discloses the limitations, the claimed features would have been obvious to modify or combine with that reference for at least the following reasons in addition to the motivations to combine identified separately in these contentions:

- All elements of the claim are disclosed in the references with no change in their respective functions, and the combination would have yielded nothing more than predictable results.
- The advantages associated with this feature were well-known and would have been appreciated by persons of ordinary skill in the art, thereby motivating the usage of this feature to combine with or modify the teachings of other references. For example, as disclosed above, various video game systems were well known in the art before the alleged invention. In addition, various video games to be played on video game systems were well known in the art before the alleged invention. The idea of modulating activity challenges based on scoring criteria was a well-known and conventional prior art concept for providing increased entertainment, which also would have obviously been used with a video game system in order to provide well-known benefits and advantages such as increased entertainment, playability via changes in difficulty, and user engagement.

- References disclosing these concepts teach the beneficial utility of them, including as cited in the claim charts submitted herewith. Defendants may rely upon the cited disclosures, among others, to show and illustrate the motivations to combine.

A person of ordinary skill in the art would have had a reasonable expectation of success in combining in the manner described above, as video games adapted to modulate activity challenges based on scoring criteria, and the technological underpinnings behind them were well-known prior to 2004, as the Scoring criteria References cited above confirm.

Specific evidence of the motivation to combine includes the references and passages therein cited in the claim charts submitted herewith for the applicable claim limitations, which reflect the reasons and motivations to combine and modify listed above and additional reasons and motivations to combine and modify that Defendants may rely upon. Defendants also expect to rely on expert testimony regarding motivation to combine.

C. Claim Charts

Under P.R. 3-3(c) and subject to Defendants' reservation of rights, attached hereto as **Exhibits A1-A34, B1-B34, C1-C34**, **D1-D34**, and **E1-E34** and incorporated by reference are claim charts providing a limitation-by-limitation analysis of where specifically, in each prior art item, each limitation of the Asserted Claims of the Asserted Patents is found. Any reference to a figure in cited text incorporates by reference the figure itself, and any citation to a figure incorporates by reference any description of that figure in a reference. As noted above, these claim charts are based on Defendants' understanding of the claim constructions applied by Plaintiff, even though Defendants do not necessarily agree with those constructions, and reserve the right to dispute them. To the extent any limitation is deemed not to be met exactly by an item of prior art, Defendants contend that the difference would have been obvious to a person of ordinary skill in

the art and within the knowledge of one skilled in the art at the time of the alleged invention, so that the claimed invention would have been obvious both in light of the single reference alone and/or in light of combined references. Defendants do not admit or concede that the element is not expressly or inherently disclosed by the reference at issue.

As a general matter, all portions of each prior art item are relied upon to support the disclosure of each patent claim limitation, as all portions provide general support. Supporting citations are nevertheless provided, but do not necessarily represent every location where a particular claim term may be found in the prior art item. Defendants reserve the right to rely on additional, or different, portions of the prior art items other than those specifically cited in these claim charts, and to supplement and/or amend these charts.

D. Invalidity Under 35 U.S.C. § 101 and 35 U.S.C. § 112 (P.R. 3-3(d))

Under P.R. 3-3(d) and subject to Defendants' reservation of rights, Defendants identify below the grounds upon which Defendants currently contend the Asserted Claims are invalid under 35 U.S.C. § 101 and 35 U.S.C. § 112. The charts do not attempt to identify all recitations of a given term or phrase in each claim. To the extent that Defendants have identified any instance of a term or limitation in a particular claim as rendering the claim invalid under Sections 101 or 112, Defendants contend that every instance of the challenged term or limitation in the claim renders the claim invalid for the same reasons.

1. Disclosure of Invalidity Under 35 U.S.C. § 101

Although not required to do so under the Patent Local Rules, Defendants include below certain grounds on which Defendants contend that the Asserted Claims of the Asserted Patents are invalid because they fail to claim subject matter eligible for patenting pursuant to 35 U.S.C. § 101. Defendants reserve the right to supplement, amend, and/or modify these Section 101 invalidity

contentions as discovery progresses. As the Patent Local Rules do not require Defendants to provide their contentions regarding unpatentable subject matter under Section 101, these contentions do not limit Defendants' rights to advance other and different arguments regarding invalidity of any of the Asserted Patents or to pursue relief in the form of dispositive motions directed to other or different claims of any of the Asserted Patents.

Section 101 provides that "[w]hoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title." 35 U.S.C. § 101. The Supreme Court has "long held that this provision contains an important implicit exception: Laws of nature, natural phenomena, and abstract ideas are not patentable." *Alice Corp. v. CLS Bank Int'l*, 134 S. Ct. 2347, 2354 (2014) (quoting *Ass'n for Molecular Pathology v. Myriad Genetics, Inc.*, 133 S. Ct. 2107, 2116 (2013)).

Each and every Asserted Claim is invalid under 35 U.S.C. § 101 and applicable case law authority. *See, e.g.*, *Alice*, 134 S. Ct. at 2354. The Supreme Court in *Alice* set forth a two-step test "for distinguishing patents that claim laws of nature, natural phenomena, and abstract ideas from those that claim patent-eligible applications of those concepts." *Alice*, 134 S. Ct. at 2355.

1. First, the Court must "determine whether the claims at issue are directed to one of those patent-ineligible concepts," such as an abstract idea. *Id.* If the Court determines that the claims are directed to a patent-ineligible concept such as an abstract idea, then:

2. The Court must "consider the elements of each claim both individually and as an ordered combination to determine whether the additional elements transform the nature of the claim into a patent-eligible application." *Id.* (citation and quotation marks omitted). The Supreme Court describes this second step "as a search for an inventive concept—*i.e.*, an element or

combination of elements that is sufficient to ensure that the patent in practice amounts to significantly more than a patent upon the ineligible concept itself." *Id.* (quotation marks and brackets omitted). For example, "[s]tating an abstract idea while adding the words 'apply it' is not enough for patent eligibility. Nor is limiting the use of an abstract idea 'to a particular technological environment.'" *Id.* at 2358 (internal citations and quotations omitted).

The Asserted Claims of the Asserted Patents are invalid under 35 U.S.C. § 101. The claims are directed to an abstract idea—generally speaking, the idea of detecting the movement of hand-held controllers. Rather than improve upon computer technology, the Asserted Claims recite generic computer components to perform the abstract idea. The claims do not require any particular configuration or specialized arrangement of the communication devices (or the components therein) and processing system. The Asserted Claims recite only the routine use of conventional and generic technology, such as communication devices, transmitters, receivers, output devices, and processing systems.

2. Disclosure of Invalidity Under 35 U.S.C. § 112(a) for Lack of Enablement and Written Description

The Asserted Claims recite elements that were already well known in the art (and therefore are anticipated and obvious). If the claims are construed to recite some novel element or combination of elements, however, then they fail to describe or enable that element or combination, including, without limitation, how it differs from what was already known.

These claims are also invalid for failure to comply with the written description requirement because they offer no indication that the inventors of the Asserted Patents were in possession of certain features claimed in the patent. *See* 35 U.S.C. § 112(1) ("The specification shall contain a written description of the invention . . . ."). To satisfy the written description requirement, a patent

specification must describe the claimed invention in sufficient detail that one skilled in the art can reasonably conclude that the inventor had possession of the claimed invention at the time of filing the patent application. *See generally Ariad Pharm., Inc. v. Eli Lilly and Co.*, 598 F.3d 1336 (Fed. Cir. 2010) (en banc).

The enablement requirement of Section 112 demands that the patent specification enable "those skilled in the art to make and use the full scope of the claimed invention without 'undue experimentation.'" *Genentech, Inc. v. Novo Nordisk A/S*, 108 F.3d 1361, 1365 (Fed. Cir. 1997) (quoting *In re Wright*, 999 F.2d 1557, 1561 (Fed. Cir. 1993)). "[T]he scope of the claims must be less than or equal to the scope of the enablement." *Nat'l Recovery Tech., Inc. v. Magnetic Separation Sys., Inc.*, 166 F.3d 1190, 1196 (Fed. Cir. 1999).

By way of non-limiting examples, Defendants contend that the specification does not provide sufficient written description of and/or are not enabled for the following limitations because the specification fails to provide any disclosure of the limitations and/or fails to support the limitations as broadly as those limitations are apparently being applied by Plaintiff in its infringement contentions:

a. '151 Patent

Claim 28 and each of its dependent claims are invalid because the specification fails to provide a sufficient written description or enabling disclosure of the full scope of at least the term "displacement vector."

Claim 29 and each of its dependent claims are invalid because the specification fails to provide a sufficient written description or enabling disclosure of the full scope of at least the terms "reference vector position" and "numerical result."

Claim 32 is invalid because the specification fails to provide a sufficient written description or enabling disclosure of the full scope of at least the terms "desired reference vector" and "numerical result."

b. '483 Patent

Claims 44 and 48 are invalid because the specification fails to provide a sufficient written description or enabling disclosure of the full scope of at least the term "calibrating the first communication device to establish a reference position."

c. '354 Patent

Claim 33 is invalid because the specification fails to provide a sufficient written description or enabling disclosure of the full scope of at least the terms "verbal command input from the user" and "modulate an activity."

Claims 57 is invalid because the specification fails to provide a sufficient written description or enabling disclosure of the full scope of at least the term "calibrating the first communication device to establish a reference position."

Claim 63 is invalid because the specification fails to provide a sufficient written description or enabling disclosure of the full scope of at least the terms "an array of receiving devices" and "calibrating the first communication device to establish a reference position."

d. '325 Patent

Claims 14, 27, 50, 103, and each of its dependent claims are invalid because the specification fails to provide a sufficient written description or enabling disclosure of the full scope of at least the term "verbal command input from the user."

Claims 24, 35, 65, 86, 90, and 107 are invalid because the specification fails to provide a

sufficient written description or enabling disclosure of the full scope of at least the phrase "wherein the system is interactive and provides real-time projection of verbal command output to the user."

Claim 33 is invalid because the specification fails to provide a sufficient written description or enabling disclosure of the full scope of at least the terms "verbal command input from the user" and "modulate an activity."

Claim 50 is invalid because the specification fails to provide a sufficient written description or enabling disclosure of the full scope of at least the term "verbal command input from the user."

Claim 57 is invalid because the specification fails to provide a sufficient written description or enabling disclosure of the full scope of at least the phrase "calibrating the first communication device to establish a reference position."

e. '659 Patent

Claims 45, 46, and 48 are invalid because the specification fails to provide a sufficient written description or enabling disclosure of the full scope of at least the phrase "game controller."

3. Disclosure of Invalidity Under 35 U.S.C. § 112(b) for Indefiniteness

To be valid, a patent claim must "particularly point [] out and distinctly claim[] the subject matter which the inventor . . . regards as the invention." 35 U.S.C. § 112(b). The Supreme Court has held that the proper standard for indefiniteness is as follows: "[A] patent is invalid for indefiniteness if its claims, read in light of the specification delineating the patent, and the prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention." *Nautilus, Inc. v. Biosig Instruments, Inc.*, 134 S. Ct. 2120, 2124, 189 L. Ed. 2d 37 (2014). The Supreme Court further explained that "a patent must be precise enough to afford

clear notice of what is claimed, thereby apprising the public of what is still open to them." *Id*. at 2129.

Indeed, to uphold claims—such as Plaintiff's—that do not clearly define the scope of the invention would thwart the ultimate purpose of the patent laws: to "promote the Progress of Science and useful Arts." *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 535 U.S. 722, 730 (2002) (quoting U.S. Const. art. I, § 8, cl. 8). As the Supreme Court explained in *Festo*, a patent claim "is a property right; and like any property right, its boundaries should be clear. This clarity is essential to promote progress, because it enables efficient investment in innovation. A patent holder should know what he owns, and the public should know what he does not." *Id.*

Certain of the Asserted Claims suffer from similar fatal defects that render them indefinite, as listed below in non-limiting examples:

a. '151 Patent

Claim 1 and each claim dependent therefrom are invalid as indefinite under 35 U.S.C. § 112, ¶ 2 because the terms "processing system adapted to determine movement information for said first communication device," and "first communication device receives and processes said data signals from said processing system" fail to inform, with reasonable certainty, those of skill in the art about the scope of the invention.

Claim 28 and each claim dependent therefrom are invalid as indefinite under 35 U.S.C. § 112, ¶ 2 because the term "displacement vector" fails to inform, with reasonable certainty, those of skill in the art about the scope of the invention.

Claim 29 and each claim dependent therefrom are invalid as indefinite under 35 U.S.C. § 112, ¶ 2 because the term "reference vector position" fails to inform, with reasonable certainty, those of skill in the art about the scope of the invention.

Claim 32 is invalid as indefinite under 35 U.S.C. § 112, ¶ 2 because the term "desired reference vector" fails to inform, with reasonable certainty, those of skill in the art about the scope of the invention.

b. '483 Patent

Claim 44 and each claim dependent therefrom are invalid as indefinite under 35 U.S.C. § 112, ¶ 2 because the terms "adapted to electrically communicate with the first communication device," "determine movement information for each of the respective communication devices," "the first hand-held communication device is adapted to receive and process the received data signals," and "wherein the user input device is adapted for calibrating the first communication device to establish a reference position" fail to inform, with reasonable certainty, those of skill in the art about the scope of the invention.

Claim 45 and each claim dependent therefrom are invalid as indefinite under 35 U.S.C. § 112, ¶ 2 because the term "processing system is adapted to determine position information for each of the respective communication devices" fails to inform, with reasonable certainty, those of skill in the art about the scope of the invention.

Claim 48 and each claim dependent therefrom are invalid as indefinite under 35 U.S.C. § 112, ¶ 2 because the terms "adapted to electrically communicate with the first communication device," "determine movement information for each of the respective communication devices," "the first hand-held communication device receives and processes the received data signals," and "wherein the user input device is adapted for calibrating the first communication device to establish a reference position" fail to inform, with reasonable certainty, those of skill in the art about the scope of the invention.

c. '354 Patent

Claim 32 and each claim dependent therefrom are invalid as indefinite under 35 U.S.C. § 112, ¶ 2 because the terms "determining movement information" and "adapted to receive and process the feedback data" fail to inform, with reasonable certainty, those of skill in the art about the scope of the invention.

Claim 33 and each claim dependent therefrom are invalid as indefinite under 35 U.S.C. § 112, ¶ 2 because the term "modulate an activity" fails to inform, with reasonable certainty, those of skill in the art about the scope of the invention.

Claim 49 and each claim dependent therefrom are invalid as indefinite under 35 U.S.C. § 112, ¶ 2 because the terms "determining movement information" and "adapted to receive and process the received data signals" fail to inform, with reasonable certainty, those of skill in the art about the scope of the invention.

Claim 50 and each claim dependent therefrom are invalid as indefinite under 35 U.S.C. § 112, ¶ 2 because the terms "determining movement information" and "adapted to receive and process the received data signals" fail to inform, with reasonable certainty, those of skill in the art about the scope of the invention.

Claims 57 is invalid as indefinite under 35 U.S.C. § 112, ¶ 2 because the phrase "the user input device is adapted for calibrating the first communication device to establish a reference position" fails to inform, with reasonable certainty, those of skill in the art about the scope of the invention.

Claims 58 and 64 and each claim dependent therefrom are invalid as indefinite under 35 U.S.C. § 112, ¶ 2 because the term "determine position information for each of the respective communication devices" fails to inform, with reasonable certainty, those of skill in the art about

the scope of the invention.

Claim 63 and each claim dependent therefrom are invalid as indefinite under 35 U.S.C. § 112, ¶ 2 because the terms "adapted to electrically communicate with the first communication device," "determine movement information," "adapted to receive and process the received data signals," and "the user input device is adapted for calibrating the first communication device to establish a reference position" fail to inform, with reasonable certainty, those of skill in the art about the scope of the invention.

Claim 72 and each claim dependent therefrom are invalid as indefinite under 35 U.S.C. § 112, ¶ 2 because the terms "adapted to electrically communicate with the first communication device," and "receives and processes the received data signals" fail to inform, with reasonable certainty, those of skill in the art about the scope of the invention.

Claim 73 and each claim dependent therefrom are invalid as indefinite under 35 U.S.C. § 112, ¶ 2 because the term "adapted to determine movement information" fails to inform, with reasonable certainty, those of skill in the art about the scope of the invention.

d. '325 Patent

Claim 1 and each claim dependent therefrom are invalid as indefinite under 35 U.S.C. § 112, ¶ 2 because the terms "determine motion information" and "adapted to receive and process the data signals" fail to inform, with reasonable certainty, those of skill in the art about the scope of the invention.

Claim 2 and each claim dependent therefrom are invalid as indefinite under 35 U.S.C. § 112, ¶ 2 because the terms "adapted to electrically communicate with the first hand-held communication device" and "adapted to determine motion information" fail to inform, with reasonable certainty, those of skill in the art about the scope of the invention.

Claim 5 and each claim dependent therefrom are invalid as indefinite under 35 U.S.C. § 112, ¶ 2 because the term "determines motion information for the first hand-held communication device and the second hand-held device" fails to inform, with reasonable certainty, those of skill in the art about the scope of the invention.

Claim 6 and each claim dependent therefrom are invalid as indefinite under 35 U.S.C. § 112, ¶ 2 because the term "processed to provide feedback data to the user based on the motion of the first hand-held communication device with respect to the second hand-held communication device" fails to inform, with reasonable certainty, those of skill in the art about the scope of the invention.

Claim 7 and each claim dependent therefrom are invalid as indefinite under 35 U.S.C. § 112, ¶ 2 because the term "determine position information" fails to inform, with reasonable certainty, those of skill in the art about the scope of the invention.

Claims 24, 35, 65, 86, 90, and 107 are invalid as indefinite under 35 U.S.C. § 112, ¶ 2 because the phrase "the user input device is adapted for calibrating the first communication device to establish a reference position" fails to inform, with reasonable certainty, those of skill in the art about the scope of the invention.

Claim 31 and each claim dependent therefrom are invalid as indefinite under 35 U.S.C. § 112, ¶ 2 because the term "determine the position" fails to inform, with reasonable certainty, those of skill in the art about the scope of the invention.

Claim 32 and each claim dependent therefrom are invalid as indefinite under 35 U.S.C. § 112, ¶ 2 because the terms "determining orientation information," "process orientation information," and "receive and process the feedback data" fail to inform, with reasonable certainty, those of skill in the art about the scope of the invention.

Claim 49 and each claim dependent therefrom are invalid as indefinite under 35 U.S.C. § 112, ¶ 2 because the terms "process movement information" and "adapted to receive and process the data signals" fail to inform, with reasonable certainty, those of skill in the art about the scope of the invention.

Claim 50 and each claim dependent therefrom are invalid as indefinite under 35 U.S.C. § 112, ¶ 2 because the terms "process motion information" and "adapted to receive and process the data signals" fail to inform, with reasonable certainty, those of skill in the art about the scope of the invention.

Claim 57 is invalid as indefinite under 35 U.S.C. § 112, ¶ 2 because the phrase "the user input device is adapted for calibrating the first communication device to establish a reference position" fails to inform, with reasonable certainty, those of skill in the art about the scope of the invention.

Claims 58, 64, 73, and each claim dependent therefrom are invalid as indefinite under 35 U.S.C. § 112, ¶ 2 because the term "determine movement information" fails to inform, with reasonable certainty, those of skill in the art about the scope of the invention.

Claim 63 and each claim dependent therefrom are invalid as indefinite under 35 U.S.C. § 112, ¶ 2 because the terms "adapted to electrically communicate with the first communication device," "process acceleration information," and "adapted to receive and process the data signals" fail to inform, with reasonable certainty, those of skill in the art about the scope of the invention.

Claim 72 and each claim dependent therefrom are invalid as indefinite under 35 U.S.C. § 112, ¶ 2 because the terms "adapted to electrically communicate with the first communication device," and "receives and processes the data signals," fail to inform, with reasonable certainty, those of skill in the art about the scope of the invention.

Claim 85 and each claim dependent therefrom are invalid as indefinite under 35 U.S.C. § 112, ¶ 2 because the terms "process motion information," and "adapted to receive and process the data signals," fail to inform, with reasonable certainty, those of skill in the art about the scope of the invention.

Claims 87 and 92 and each claim dependent therefrom are invalid as indefinite under 35 U.S.C. § 112, ¶ 2 because the term "processes orientation information" fails to inform, with reasonable certainty, those of skill in the art about the scope of the invention.

Claim 88 and each claim dependent therefrom are invalid as indefinite under 35 U.S.C. § 112, ¶ 2 because the term "processes position information" fails to inform, with reasonable certainty, those of skill in the art about the scope of the invention.

Claim 89 and each claim dependent therefrom are invalid as indefinite under 35 U.S.C. § 112, ¶ 2 because the terms "process position information," and "adapted to receive and process the data signals," fail to inform, with reasonable certainty, those of skill in the art about the scope of the invention.

Claim 93 and each claim dependent therefrom are invalid as indefinite under 35 U.S.C. § 112, ¶ 2 because the term "processes motion information" fails to inform, with reasonable certainty, those of skill in the art about the scope of the invention.

Claim 94 and each claim dependent therefrom are invalid as indefinite under 35 U.S.C. § 112, ¶ 2 because the term "determine motion information" fails to inform, with reasonable certainty, those of skill in the art about the scope of the invention.

Claim 95 and each claim dependent therefrom are invalid as indefinite under 35 U.S.C. § 112, ¶ 2 because the term "adapted to electrically communicate with the first hand-held communication device" fails to inform, with reasonable certainty, those of skill in the art about the

scope of the invention.

e. '659 Patent

Claim 45 and each claim dependent therefrom are invalid as indefinite under 35 U.S.C. § 112, ¶ 2 because the terms "provide data to the output device for outputting feedback based on the motion of the first hand-held game controller," "in response to the user input data, output control data for communication to the remote processing system," "output data for communication to the remote processing system for controlling motion of a first virtual object displayed in a computer generated virtual environment displayed on a remote display and where the motion of the first virtual object is in proportion with the motion of the first hand-held game controller," and "placement at a distance from a user" fail to inform, with reasonable certainty, those of skill in the art about the scope of the invention.

Claim 46 and each claim dependent therefrom are invalid as indefinite under 35 U.S.C. § 112, ¶ 2 because the terms "receive input relating to motion of the second hand-held game controller and output data for communication to the remote processing system for controlling motion of a second virtual object in the computer generated virtual environment displayed on a remote display and where the motion of the second virtual object is in proportion with the motion of the second hand-held game controller" and "placement at a distance from a user" fail to inform, with reasonable certainty, those of skill in the art about the scope of the invention.

Claim 48 and each claim dependent therefrom are invalid as indefinite under 35 U.S.C. § 112, ¶ 2 because the terms "receive input relating to orientation of the first hand-held game controller and provide output to the output device for providing feedback based on the orientation" and "placement at a distance from a user" fail to inform, with reasonable certainty, those of skill in the art about the scope of the invention.

E. Invalidity Under 35 U.S.C. § 102(f)

Under P.R. 3-3(d) and subject to Defendants' reservation of rights, Defendants identify below the grounds upon which Defendants currently contend the Asserted Claims are invalid under 35 U.S.C. § 102(f). Defendants identify Barry J. French as the person from whom the invention or any part of it was derived, rendering the claims invalid under Title 35 U.S.C. §§ 102(f) and 116 for failing to name an inventor.

Upon information and belief, one of the inventors of the Asserted Patents, Kevin Ferguson, was "responsible for hardware, firmware, and software development for the TRAZER product, an interactive, infrared tracking system" while employed by Trazer Technologies. Kevin Ferguson is a listed inventor on U.S. Patent 6,430,997 (the "'997 Patent"), which is a system and method for tracking and assessing movement skills in multidimensional space that is owned or held by Trazer Technologies. The other inventor of the '997 Patent is Barry J. French (not Donald Gronachan, the co-inventor of the Asserted Patents). Mr. French and Mr. Ferguson are named as co-inventors on other patents including U.S. Patent No. 6,073,489, U.S. Patent No. 6,098,458, and U.S. Patent No. 6,308,565. Additionally, under information and belief, Mr. Ferguson and Mr. French jointly worked on the Trazer movement tracking system, which can be located at the following website: https://web.archive.org/web/20030205060825/http://trazer.com/products.htm.

Therefore, to the extent the alleged invention(s) of the Asserted Patents were derived from prior art disclosed above, Mr. French is an inventor of the Asserted Patents under 35 U.S.C. § 116. And the Asserted Patents are therefore invalid under 35 U.S.C. § 102(f) for failing to name an inventor. Defendants are still investigating and will supplement these contentions as discovery progresses.

II. OTHER PRIOR ART

In addition to the prior art references that Defendants has specifically discussed in these Invalidity Contentions, Defendants identify each reference produced and cited in the accompanying document production of the same date. All of these references are relevant prior art, and Defendants reserve the right to rely on them based on their continuing research and analysis of the Asserted Claims, accused instrumentalities, and the prior art.

Dated: March 5, 2019

Respectfully submitted,

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APPENDIX A – PRIOR ART INDEX

#	Reference	Inventor(s)/ Author(s)	Priority Date	Publication Date	Issue Date	Chart(s)
1	U.S. Patent No. 5,971,850	Howard L. Liverance	11/12/1981	--	10/26/1999	
2	U.S. Patent No. 4,491,325	Thomas Bersheim	1/26/1983	--	1/1/1985	
3	U.S. Patent No. 4,591,156	Maurizio Attenni	11/26/1984	--	5/27/1986	
4	U.S. Patent No. 4,657,247	Kazuo Okada	12/12/1984	--	4/14/1987	
5	U.S. Patent No. 5,001,632	Justin Hall-Tipping	12/22/1989	--	3/19/1991	
6	U.S. Patent No. 5,181,181	Brian J. Glynn	9/27/1990	--	1/19/1993	
7	U.S. Patent No. 6,906,700	Brad A. Armstrong	3/5/1992	--	6/14/2005	
8	U.S. Patent No. 5,610,631	Frank M. Bouton, et al.	7/9/1992	--	3/11/1997	
9	U.S. Patent No. 5,396,267	Frank M. Bouton	7/9/1992	--	3/7/1995	
10	U.S. Patent No. 5,683,082	Takatoshi Takemoto, et al.	8/4/1992	--	11/4/1997	
11	U.S. Patent No. 5,377,100	Alan T. Pope, et al.	3/8/1993	--	12/27/1994	
12	U.S. Patent No. 5,734,373	Louis B. Rosenberg, et al.	7/16/1993	--	3/31/1998	
13	U.S. Patent No. 5,423,554	Geoffrey M. Davis	9/24/1993	--	6/13/1995	
14	U.S. Patent No. 5,806,849	Ricky Allen Rutkowski	2/17/1994	--	9/15/1998	
15	U.S. Patent No. 6,162,191	Eric M. Foxlin	6/16/1994	--	12/19/2000	

#	Reference	Inventor(s)/ Author(s)	Priority Date	Publication Date	Issue Date	Chart(s)
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17	U.S. Patent No. 5,645,277	Chou Cheng	11/15/1994	--	7/8/1997	
18	U.S. Patent No. 5,667,220	Chou Cheng	11/15/1994	--	9/16/1997	
19	U.S. Patent No. 5,913,727	Ned Ahdoot	6/2/1995	--	6/22/1999	
20	U.S. Patent No. 6,348,911	Louis B. Rosenberg, et al.	9/27/1995	--	2/19/2002	
21	U.S. Patent No. 7,253,803	Bruce M. Schena, et al.	11/17/1995	10/4/2001	8/7/2007	
22	U.S. Patent No. 6,424,333	Mark. R. Tremblay, et al.	11/30/1995	--	7/23/2002	
23	U.S. Patent No. 6,028,593	Louis B. Rosenberg, et al.	12/1/1995	--	2/22/2000	
24	U.S. Patent No. 5,703,623	Malcolm G. Hall, et al.	1/24/1996	--	12/30/1997	A-10 B-10 C-10 D-10 E-10
25	JP Patent Publ. 10063412	Yukihiro Wakasugi	8/23/1996	3/6/1998	--	
26	U.S. Patent No. 5,796,354	Michael C. Cartabiano, et al.	2/7/1997	--	8/18/1998	
27	U.S. Patent No. 6,020,876	Louis B. Rosenberg, et al.	4/14/1997	--	2/1/2000	
28	U.S. Patent No. 6,030,290	Donald E. Powell	6/24/1997	--	2/29/2000	
29	U.S. Patent No. 6,252,579	Louis B. Rosenberg, et al.	8/23/1997	--	6/26/2001	

#	Reference	Inventor(s)/ Author(s)	Priority Date	Publication Date	Issue Date	Chart(s)
30	U.S. Patent No. 6,162,123	Thomas G. Woolston	11/25/1997	--	12/19/2000	A-1 B-1 C-1 D-1 E-1
31	U.S. Patent No. 7,151,527	Craig F. Culver	12/3/1997	10/11/2001	12/19/2006	
32	U.S. Patent No. 5,984,880	Ralph H. Lander, et al.	1/20/1998	--	11/16/1999	
33	U.S. Patent No. 6,067,077	Kenneth M. Martin, et al.	4/10/1998	--	5/23/2000	
34	U.S. Patent No. 6,686,901	Louis B. Rosenberg	6/23/1998	10/4/2001	2/3/2004	
35	U.S. Patent No. 6,563,487	Kenneth M. Martin, et al.	6/23/1998	2/13/2003	5/13/2003	
36	U.S. Patent No. 6,184,868	Erik J. Shahoian, et al.	9/17/1998	--	2/6/2001	
37	JP Patent No. 4,089,031	Hidenori Watanabe	9/21/1998	4/7/2000	5/21/2008	
38	U.S. Patent No. 6,456,977	Jong-Ding Wang	10/15/1998	--	9/24/2002	
39	U.S. Patent No. 6,538,666	Muneaki Ozawa, et al.	12/11/1998	--	3/25/2003	
40	WO Publ No. 200041381	David E. Schultz, et al.	1/4/1999	7/13/2000	--	
41	U.S. Patent No. 6,695,770	Dominic Kin Leung Choy, et al.	4/1/1999	--	2/24/2004	A-12 B-12 C-12 D-12 E-12
42	U.S. Patent No. 6,762,745	Adam C. Braun, et al.	5/10/1999	--	7/13/2004	
43	U.S. Patent No. 6,903,721	Adam C. Braun, et al.	5/11/1999	11/28/2002	6/7/2005	
44	U.S. Patent No. 6,545,661	Patrick E. Goschy, et al.	6/21/1999	--	4/8/2003	

#	Reference	Inventor(s)/ Author(s)	Priority Date	Publication Date	Issue Date	Chart(s)
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46	U.S. Patent No. 7,218,310	Kollin M. Tierling, et al.	9/28/1999	3/14/2002	5/15/2007	
47	U.S. Patent No. 6,680,729	Erik J. Shahoian, et al.	9/30/1999	--	1/20/2004	
48	U.S. Patent App. Publ. 2001/0024973	Christopher Meredith	12/10/1999	9/27/2001	--	
49	U.S. Patent No. 7,183,480	Yoshiki Nishitani, et al.	1/11/2000	8/23/2001	2/27/2007	A-29 B-29 C-29 D-29 E-29
50	U.S. Patent App. Publ. 2001/0008849	Nobuhiro Komata	1/14/2000	7/19/2001	--	
51	U.S. Patent No. 6,761,637	Denise C. Weston, et al.	2/22/2000	10/25/2001	7/13/2004	
52	U.S. Patent No. 6,429,849	Bin An, et al.	2/29/2000	--	8/6/2002	
53	U.S. Patent No. 7,965,276	Kenneth M. Martin, et al.	3/9/2000	--	6/21/2011	
54	U.S. Patent No. 6,924,787	James F. Kramer, et al.	4/17/2000	2/21/2002	8/2/2005	
55	U.S. Patent No. 7,196,688	Bruce M. Schena	5/24/2000	5/9/2002	3/27/2007	
56	U.S. Patent No. 6,864,778	Rudy Musschebroeck, et al.	5/30/2000	1/10/2002	3/8/2005	
57	U.S. Patent No. 6,891,526	Bernd Gombert, et al.	6/19/2000	12/20/2001	5/10/2005	
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60	U.S. Patent No. 7,236,618	Chee-Kong Chui, et al.	7/7/2000	--	6/26/2007	
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62	U.S. Patent No. 6,906,697	Louis B. Rosenberg, et al.	8/11/2000	7/4/2002	6/14/2005	
63	U.S. Patent No. 6,995,744	David F. Moore, et al.	9/28/2000	--	2/7/2006	
64	U.S. Patent No. 7,084,854	David F. Moore, et al.	9/28/2000	--	8/1/2006	
65	U.S. Patent No. 6,913,536	Toshikazu Tomizawa, et al.	3/23/2001	9/26/2002	7/5/2005	
66	U.S. Patent No. 7,001,272	Akihisa Yamashita, et al.	3/29/2001	10/17/2002	2/21/2006	
67	U.S. Patent No. 7,202,851	Richard L. Cunningham, et al.	5/4/2001	11/7/2002	4/10/2007	A-31 B-31 C-31 D-31 E-31
68	U.S. Patent No. 6,933,920	Robert LaCroix, et al.	9/24/2001	3/27/2003	8/23/2005	
69	U.S. Patent No. 7,623,114	Stephen D. Rank	10/9/2001	4/10/2003	11/24/2009	
70	U.S. Patent No. 6,703,550	Lonny L. Chu	10/10/2001	4/10/2003	3/9/2004	
71	U.S. Patent No. 6,800,031	Christopher Di Cesare	4/15/2002	10/16/2003	10/5/2004	
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74	U.S. Patent No. 7,161,579	Tyler Jon Daniel	7/18/2002	1/22/2004	1/9/2007	
75	U.S. Patent App. Publ. 2004/0012557	Tyler Jon Daniel	7/18/2002	1/22/2004	--	A-9 B-9 C-9 D-9 E-9
76	U.S. Patent No. 7,623,115	Richard L. Marks	7/27/2002	10/21/2004	11/24/2009	
77	U.S. Patent App. Publ. 2004/0063480	Xiaoling Wang	9/30/2002	4/1/2004	--	
78	U.S. Patent No. 7,353,112	Eun-Seok Choi, et al.	3/18/2003	11/25/2004	4/1/2008	
79	U.S. Patent No. 8,992,322	Shoichi Endo, et al.	6/9/2003	1/27/2005	3/31/2015	
80	U.S. Patent No. 7,042,438	Michael W. McRae, et al.	9/6/2003	3/10/2005	5/9/2006	
81	U.S. Patent App. Publ. 2005/0054457	Richard D. Eyestone, et al.	9/8/2003	3/10/2005	--	A-28 B-28 C-28 D-28 E-28
82	"Inertial Head-Tracker Sensor Fusion by a Complementary Separate-Bias Kalman Filter"	Eric Foxlin	--	1996	--	
83	The vBow: A Haptic Musical Controller Human-Computer Interface	Charles Nichols	--	08/01/2000	--	A-20 B-20 C-20 D-20 E-20

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85	A Survey of Tracking Technology for Virtual Environments	Jannick P. Rolland	--	2001	--	A-22 B-22 C-22 D-22 E-22
86	Portable Orientation Estimation Device Based on Accelerometers, Magnetometers and Gyroscope Sensors for Sensor Network	Tatsuya Harada, et al.	--	07/01/2003	--	A-18 B-18 C-18 D-18 E-18
87	Virtual Environment Technology for Training (VETT)	J. Salisbury, et al.	--	03/1992	--	A-19 B-19 C-19 D-19 E-19
88	U.S. Patent No. 10,198,079	Louis B. Rosenberg	10/23/2001	--	02/05/2019	
89	U.S. Patent No. 9,778,745	Adam C. Braun et al.	11/14/1997	--	10/03/2017	
90	U.S. Patent No. 9,740,290	Louis B. Rosenberg et al.	12/17/1999	--	08/22/2017	
91	U.S. Patent No. 10,007,345	Louis B. Rosenberg	03/09/2001	--	06/26/2018	
92	U.S. Patent No. RE45884	Evan F. Wies et al.	06/30/2000	--	02/09/2016	
93	U.S. Patent No. 9,323,332	Adam C. Braun et al.	11/14/1997	--	04/26/2016	
94	U.S. Patent No. 9,690,379	Mark R. Tremblay et al.	11/30/1995	--	06/27/2017	

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96	U.S. Patent No. 9,280,205	Louis B. Rosenberg et al.	12/17/1999	--	03/08/2016	
97	U.S. Patent No. 8,686,941	Stephen D. Rank	10/09/2001	--	04/01/2014	
98	U.S. Patent No. RE44277	Bruce M. Schena	05/24/2000	--	06/11/2013	
99	U.S. Patent No. 8,928,581	Adam C. Braun et al.	11/14/1997	--	01/06/2015	
100	U.S. Patent No. 8,279,172	Adam C. Braun et al.	11/13/1996	--	10/02/2012	
101	U.S. Patent No. 8,638,308	Richard L. Cunningham et al.	05/04/2001	--	01/28/2014	
102	U.S. Patent No. 8,004,492	James F. Kramer et al.	04/17/2000	--	08/23/2011	
103	U.S. Patent No. 8,462,116	Ryan D. Bruneau et al.	06/23/1998	--	06/11/2013	
104	U.S. Patent No. 8,717,287	Dean C. Chang et al.	04/25/1997	--	05/06/2014	
105	U.S. Patent No. 8,743,057	Louis B. Rosenberg	12/07/1999	--	06/03/2014	
106	U.S. Patent No. 8,072,422	Louis B. Rosenberg et al.	12/01/1995	--	12/06/2011	
107	U.S. Patent No. 8,441,437	Stephen D. Rank	10/09/2001	--	05/14/2013	
108	U.S. Patent No. 8,169,402	Erik J. Shahoian et al.	07/01/1999	--	05/01/2012	
109	U.S. Patent No. 7,679,611	Bruce M. Schena	05/24/2000	--	03/16/2010	
110	U.S. Patent No. 7,916,121	Adam C. Braun et al.	11/13/1996	--	03/29/2011	
111	U.S. Patent No. 8,188,989	Michael D. Levin et al.	11/26/1996	--	05/29/2012	

#	Reference	Inventor(s)/ Author(s)	Priority Date	Publication Date	Issue Date	Chart(s)
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113	U.S. Patent No. 8,212,772	Erik J. Shahoian	12/21/1999	--	07/03/2012	
114	U.S. Patent No. 8,125,442	Lonny L. Chu	10/10/2001	--	02/28/2012	
115	U.S. Patent No. 8,103,472	Adam C. Braun et al.	05/11/1999	--	01/24/2012	
116	U.S. Patent No. 7,511,706	Bruce M. Schena	05/24/2000	--	03/31/2009	
117	U.S. Patent No. 8,059,105	Louis B. Rosenberg et al.	06/23/1998	--	11/15/2011	
118	U.S. Patent No. 8,063,893	Louis B. Rosenberg et al.	06/23/1998	--	11/22/2011	
119	U.S. Patent No. 8,049,734	Louis B. Rosenberg et al.	06/23/1998	--	11/01/2011	
120	U.S. Patent No. 7,982,720	Louis B. Rosenberg et al.	06/23/1998	--	07/19/2011	
121	U.S. Patent No. 7,978,183	Louis B. Rosenberg et al.	06/23/1998	--	07/12/2011	
122	U.S. Patent No. 7,969,288	Adam C. Braun et al.	11/14/1997	--	06/28/2011	
123	U.S. Patent No. 8,368,641	Marc R. Tremblay et al.	11/30/1995	--	02/05/2013	
124	U.S. Patent No. 8,188,981	Erik J. Shahoian et al.	01/19/2000	--	05/29/2012	
125	U.S. Patent No. 8,063,892	Erik J. Shahoian et al.	01/19/2000	--	11/22/2011	
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128	U.S. Patent No. 7,969,416	Marc R. Tremblay et al.	11/30/1995	--	06/28/2011	
129	U.S. Patent No. 9,360,937	Louis B. Rosenberg	03/09/2001	--	06/07/2016	
130	U.S. Patent No. 8,739,033	Louis B. Rosenberg	10/23/2001	--	05/27/2014	
131	U.S. Patent No. 7,986,303	Adam C. Braun et al.	11/14/1997	--	07/26/2011	
132	U.S. Patent No. 7,864,164	Richard L. Cunningham et al.	05/04/2001	--	01/04/2011	
133	U.S. Patent No. 8,487,873	Louis B. Rosenberg	06/23/1998	--	07/16/2013	
134	U.S. Patent No. 8,020,095	Adam C. Braun et al.	11/14/1997	--	09/13/2011	
135	U.S. Patent No. 7,768,504	Louis B. Rosenberg et al.	06/23/1998	--	08/03/2010	
136	U.S. Patent No. 9,411,420	Erik J. Shahoian et al.	09/30/1999	--	08/09/2016	
137	U.S. Patent No. 7,425,675	Lonny Chu	10/10/2001	--	09/16/2008	
138	U.S. Patent No. 7,821,493	Kollin M. Tierling et al.	09/28/1999	--	10/26/2010	
139	U.S. Patent No. 7,339,572	Bruce M. Schena	05/24/2000	--	03/04/2008	
140	U.S. Patent No. 9,582,077	Louis B. Rosenberg et al.	12/01/1995	--	02/28/2017	
141	U.S. Patent No. 7,489,309	Michael D. Levin et al.	11/26/1996	--	02/10/2009	
142	U.S. Patent No. 8,102,364	Kollin M. Tierling	08/02/2001	--	01/24/2012	

#	Reference	Inventor(s)/ Author(s)	Priority Date	Publication Date	Issue Date	Chart(s)
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144	U.S. Patent No. 7,493,365	Evan F. Wies et al.	06/30/2000	--	02/17/2009	
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147	U.S. Patent No. 8,527,873	Adam C. Braun et al.	11/14/1997	--	09/03/2013	
148	U.S. Patent No. 7,688,310	Louis B. Rosenberg	12/07/1999	--	03/30/2010	
149	U.S. Patent No. 7,701,438	Dean C. Chang et al.	04/25/1997	--	04/20/2010	
150	U.S. Patent No. 7,602,384	Louis B. Rosenberg et al.	06/23/1998	--	10/13/2009	
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152	U.S. Patent No. 7,307,619	Richard L. Cunningham et al.	05/04/2001	--	12/11/2007	
153	U.S. Patent No. 7,592,999	Louis B. Rosenberg et al.	06/23/1998	--	09/22/2009	
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168	U.S. Patent No. 7,656,388	Bruce M. Schena et al.	07/01/1999	--	02/02/2010	
169	U.S. Patent No. 7,548,232	Erik J. Shahoian et al.	01/19/2000	--	06/16/2009	
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535	U.S. Patent Application No. 2002/0113771	Louis B. Rosenberg et al.	06/09/1995	08/22/2002	11/26/2002	
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#	System	Date of Offer or Use or Information Became Known	Identity of Person or Entity	Chart(s)
S1	THRED	Publicly disclosed at least as early as March 1997	Chris D. Shaw, Mark Green	A-4 B-4 C-4 D-4 E-4
S2	InterSense IS-900	Offered for sale in the US at least as early as October 17, 2002	InterSense	A-6 B-6 C-6 D-6 E-6

#	System	Date of Offer or Use or Information Became Known	Identity of Person or Entity	Chart(s)
S3	DataGlove	Offered for sale in the US at least as early as November 1992	VPL Research	A-7 B-7 C-7 D-7 E-7
S4	Hey You, Pikachu	Offered for sale in the US at least as early as November 6, 2000	Nintendo of America, Inc.	--
S5	Sega Dreamcast Seaman	Offered for sale in the US at least as early as August 9, 2000	Sega	--
S6	TRAZER	Offered for sale in the US at least as early as February 5, 2003	TRAZER Technologies Inc.	--
S7	Virtuality 1000 CS	Offered for sale in the US at least as early as 1993	W-Industries	--
S8	TeleTact Glove	Offered for sale in the US at least as early as November 1992	Advanced Robotics Research Center, Airmuscle Ltd.,	--
S9	Logitech Cordless Rumblepad	Offered for sale in the US at least as early as June 29, 2003	Logitech International S.A.	--
S10	The Immersion 3D-Interaction Product Line	Publicly disclosed at least as early as 2000.	Sergei V. Adamovich et al.	A-32 B-32 C-32 D-32 E-32

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Defendants' Joint Preliminary Invalidity Contentions

CERTIFICATE OF SERVICE

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